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Original Articles.

A CLINICAL STUDY OF THE SECRETIONS OF THE DIGESTIVE TRACT.*

BY THOMAS R. BROWN, M.D., BALTIMORE.

IT might seem almost a work of supererogation to present a paper on digestion in this city—the home of Cannon, through whose brilliant studies we have been led to a real appreciation of the significance of the motor functions of the gastro-intestinal tract. Based on these and other studies, no one can fail to realize that in the interpretation of symptoms and of signs in digestive physiology and pathology, the study of the motor sphere plays the predominant rôle, and, in fact, in many clinics the secretions are not studied at all, the entire attention being devoted to the radioscopic and radiographic study of the digestive tract, as by many it is felt that this is all that is necessary and that the study of gastric, pancreatic and intestinal secretions adds little, if anything, to the appreciation of the underlying pathological process. We feel that this is a very wrong as well as an unfortunate point of view; we believe that these secretory studies not only add to our physiological knowledge in such cases, but furnish data of value both in diagnosis and treatment, and in our paper this evening we shall briefly review our work of the past few years on the digestive secretions, in support of this viewpoint. We shall discuss in turn our studies on (*a*) the saliva, especially as regards the relationship between it and the gastric juice, (*b*) the relation of pepsin and rennin, and of pepsin and hydrochloric acid in the gastric contents, (*c*) the significance of the absence of hydrochloric acid in the stomach, (*d*) the study of the soluble proteid contents of the gastric juice in the diagnosis of gastric carcinoma, (*e*) the gastrogenous diarrheas, (*f*) the quantitative estimation of the pancreatic ferments in stool and urine, (*g*) the diagnostic value of the diminution or absence of the pancreatic ferments in the stool, (*h*) the pancreatic secretion in achylia gastrica, (*i*) the influence of jaundice upon the pancreatic function, (*j*) the effect of radium upon the digestive ferments, and (*k*) ferments of the small intestine. Lack of time will prevent us from discussing other questions of almost equal interest—the gastric secretions in visceroptosis, certain problems associated with hyperchlorhydria, etc.

It would take us much too far afield to discuss the complicated question of the nature of the ferments, their properties, chemical and physical, the nature of their reactions, the question of their specificity, and their reverse action; and yet we must call attention briefly to the latest views held regarding them, as these must be properly understood before one can arrive at a proper interpretation of the findings.

In considering the action of enzymes, certainly the most helpful view is that ferment and substrate occupy the same relationship as toxin and antitoxin, lysin and antilysin, with its specificity of action due to its haptophore group.

The intimate connection between gastric discharge and the flow of bile, pancreatic and duodenal secretions is, of course, well known. We know that vagus impulses cause the initial psychical gastric juice, and also increase pyloric tonus; that the control of the pylorus is fundamentally due to the acid in the gastric contents and that of the first portion of the duodenum—in the former causing opening, in the latter closing—and that the latter seems to be the stronger reflex of the two; we realize that the differential discharge of different foodstuffs is, in the main, explicable upon the rapidity with which the acid reaches the pylorus and duodenum; and that fats inhibit both secretion and pyloric tonus.

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* Read by invitation at the Peter Bent Brigham Hospital, April 11, 1916.

Certain facts are not so easy to explain: the rapid discharge of water and of egg-white, the rapid emptying in achylia gastrica, etc. We have shown in dogs the importance of the tonicity of the fluid in this connection, hypertonic fluids leaving the stomach much more slowly than iso- or hypotonic.

As regards the pathological gastric secretion, we know that its absence or diminution is associated with a low degree of pyloric tonus, which accounts for the reflux of duodenal contents in achylia gastrica and after fat feeding. The pancreatic secretion is under both psychic and chemical control, the former easily shown in dogs with pancreatic fistula, secretion beginning from one to one and a half minutes after the ingestion of food, and even after the sight or smell of it, and lasting for from ten to thirty minutes. The alkalinity of the juice not only furnishes a medium suitable for the action of its ferments, but also plays a large rôle in the pyloric reflex.

The important ferments of the pancreas—diastase, lipase, and trypsin-zymogen—are, according to many investigations, secreted in varying amounts, according to the character of the food; other ferments have also been described—a rennin, a haemolysin-zymogen, a nuclease. Bickel has shown that the pancreas is subject to secretory variations analogous to those seen in the stomach, Wohlgemuth the opposing action of the pancreas and the suprarenals, and we the primary stimulating and secondary inhibiting effect of bile upon this secretion. It is conceivable that the pancreatic secretion may be brought about through nervous channels, as Pavlow believes, by the direct action of substances preformed in the food or the products of digestion, or by a hormone, the last being unquestionably the major cause under physiological conditions. This is formed by the conversion of the prosecretin found in the duodenal mucous membrane into secretin by the action of hydrochloric acid, while a similar stimulant action follows the administration of water, fats, and soaps, the two former producing a very faint, the latter a fairly strong secretion, possibly due to another secretin—saprokrinin; while the action of fat is probably reflex, not hormonic.

Probably activated through secretin, and also possibly through nervous channels as well, the bile also plays an important part in duodenal digestion, not so much from its ferments—as, with a possible faint trace of diastase and of a proteolytic enzyme, it has none—but by its activating influence upon trypsin, diastase, and especially lipase, and its large rôle in aiding the absorption of fats by change in the physical as well as the chemical status of the medium, largely through the influence of bile-salts, which diminish surface tension and dissolve fatty acids, soaps, lecithin, and cholesterin, these bile salts being probably reabsorbed and again acting as stimulants of hepatic secretion. While the secretion of bile seems to be continuous, its elimination is, according to most observers, largely dependent upon the same mechanism as that of the pancreatic and duodenal secretions—secretin.

It is interesting to remember that in the duodenum under physiological conditions the simultaneous presence of the three juices necessary for a complete duodenal digestion is insured, in the main, by the same mechanism, although in the intestinal juice there is also probably a new secretin which may cause renewed flow after absorption. On the other hand, direct mechanical stimulation of the duodenal mucous membrane causes a secretion, while there is the possibility of a psychic and reflex secretion as well. The duodenal juice is alkaline, but less so than the pancreatic secretion.

One has but to mention the ferments present in the duodenal secretion or in the wall of the gut to realize the extreme complexity of the chemical and physical processes carried on here. Besides the prosecretin—not a ferment, of course, but of fundamental importance in the calling forth of ferments—we have erepsin, enterokinase, arginase, nuclease, lipase, maltase, invertase, lactase, a slight trace of diastase from Brunner's glands, a haemolysin, and a glucoside- and a cellulose-splitting ferment. The fact that extracts of the wall are much richer in ferment than the juice itself, notably in the case of erepsin and the inverting ferment for the converson of di- into mono-saccharides, suggests that a considerable part of the ferment action takes place as the substances pass through the wall, the time for which, according to Heidenhain, takes at least several minutes. Of these ferments the most interesting, perhaps, are erepsin, which is also present in many tissues of the body and which accelerates the digestion of the end-products of peptic action, and the enterokinase which converts the inactive trypsinogen into active trypsin.

Prosecretin seems to be present in the whole thickness of the mucous membrane, the enterokinase in much greater abundance in the cells covering the villi. While there is no absolute proof of it, it is probable that the same selective tendencies as regards the character of the food ingested is met with in the duodenal secretion as in the pancreatic flow, with the same possibilities of qualitative and quantitative functional variations.

Certainly, ferments are almost, if not quite specific in action, and in many cases are capable of reversible action, are soluble in water, precipitated by alcohol, absorbed by various substances, such as charcoal, kaolin, etc., have an optimum temperature and an optimum reaction of the medium in which they act, are destroyed by heat, are in some cases met as ferments, in other cases as pro-ferments or zymogens. In their study the greatest accuracy of technic is essential, for extremely slight variations in reaction or temperature of medium may produce enormous variations in the activity of the ferment, and certainly many of the conflicting reports in this field of work are due to a lack of appreciation of this fact.

Perhaps a brief enumeration of the digestive ferments is advisable before reporting our findings in this field. Of the ferments which act upon proteids we meet the pepsin-zymogen of the fundic portion of the stomach, activated by the hydrochloric acid normally present in the gastric content; the rennin found either as ferment or zymogen in gastric juice and to a much less extent in pancreatic and small intestinal juices; the trypsin-zymogen of the pancreas activated by the enterokinase of the small intestine; the erepsin of the pyloric mucosa and of the mucosa and secretion of the intestine, converting peptones into amino acids; the autolytic ferments of the liver and other organs and tissues, the alpha- and beta-proteases of Jacoby, probably of fundamental importance in intermediary metabolism; ferments acting upon the carbohydrates, the diastase of the salivary glands, pancreas and, to a very slight extent, of the small intestine, and the invertase, maltase, and lactase of the intestinal juice and mucosa; the fat-splitting ferment or lipase mostly from the pancreas, but also present in small amount in gastric contents and intestinal juice, and peculiarly activated by the bile salts; and certain other ferments of great interest, although present in but small amount, whose function is not quite so well understood, such as arginase, nuclease, certain ferments acting on the purin bases, and various oxydases, such as aldehydase, tyrosinase, and possibly certain reducing and glucoside-splitting ferments.

Although, according to most observers, the large intestine secretes no enzymes, Wakabayashi and Wohlgemuth claim to have demonstrated erepsin, a peptolytic ferment, and fibrin ferment. One must never forget, also, that not only in the leucocytes, but also in bacteria, many ferments are found which may duplicate the action of the normal enzymes, and also the fact that a similar effect may be produced by various metals in colloid form, which, incidentally, has been utilized in the treatment of malignant neoplasm by the injection of colloid selenium or colloid copper, based mainly upon Wassermann's experiments.

(a) *The Relation Between the Salivary and Gastric Secretions.*

We have been especially interested in a group of cases of stomatitis, gingivitis, and glossitis—erosions or superficial ulcerations of gums or tongue or buccal mucous membrane, usually associated with absence of hydrochloric acid in the gastric juice, and singularly resistant to treatment, which by no stretch of the imagination could be regarded as oral manifestations of the two diseases in which sore mouth is so frequently found—sprue and pellagra. With Dr. Freeman, we have studied the saliva in 47 cases to determine whether there was any relationship between the character of the saliva and of the gastric juice, our method being to collect all the saliva produced by the chewing of a piece of rubber of definite size, shape and weight for 20 minutes, always, of course, a long time after the patient had taken food. Our series comprised 10 normal cases, 6 of subacidity, 10 of achylia, or, properly speaking, achlorhydria, 6 of which showed changes in the mouth, tongue, or gums, and only one associated with malignancy, and 15 of hyperacidity or hyperchlorhydria; determining the total amount of saliva, its reaction, and the amount of diastatic ferment. The normal average amount was 22.5 c.c., the average alkalinity, 4, while the diastase ferment, measured by its ability to digest soluble starch, was always present, though showing rather wide variations. The results of our studies showed that as regards quantity of saliva, its reaction and richness in ferment, changes in the gastric secretion have no appreciable effect; in other words, there is no definite relationship between the character of the gastric juice and of the saliva, and, therefore, that it is highly improbable that changes in the saliva play any considerable part in the development of glossitis, gingivitis and stomatitis so frequently met with in cases of gastric achylia. These results were probably to be expected, as mouth and stomach comprise between them, as it were, a complete secretory apparatus, the former furnishing diastase, the latter, pepsin, rennin, and lipase, and thus are quite analogous to the two secretory apparatuses of a lower level—the pancreas and the small intestine, each with its complete set of ferments to digest all types of foodstuffs. We are now, therefore, determining whether there is any relationship between the saliva and the pancreatic secretion.

Interesting from a physiological point of view was the demonstrated fact that the chewing of bland substances, stimulating neither to the senses of smell nor of taste, produced a flow of saliva quite rich in diastatic ferment,—a view rather opposed to the general physiological opinion. It is also an interesting fact that some of these cases of sore tongue or sore mouth are relieved by the administration of muriatic acid, or pancreatin, or both.

In the very scant studies in this field the approach has usually been from the other side, that is, the influence of the saliva upon the gastric secretion. Sticker showed that deficient salivary activity is followed by arrest or diminution of the hydrochloric acid secretion, while Biernacki and Schard showed that it was not the saliva *per se*, but its combination with food, that stimulated gastric secretion. We did not study the peptolytic ferment or substance of the saliva which is capable of splitting glycyltryptophan.

(b) *The Relation of Pepsin and Rennin, and Pepsin and Hydrochloric Acid.*

There has been much discussion as to whether pepsin and rennin are separate ferments or are identical, Pawlow and many of his followers holding that they are identical; Heidenhain and perhaps the majority of workers believing that they are separate and distinct ferments, the more recent work of Rütimeyer, Einhorn and Laporte agreeing with this latter view. Of course, there are many arguments in favor of their being different, as, for example, that pepsin acts only in acid, rennin in acid, neutral or slightly alkaline media, and the variation in the viability of the two ferments. Dr. Schnack has carried on under our direction a series of experiments in this connection, estimating pepsin by the Mett method, rennin by the Boas procedure, hydrochloric acid by the use of Toepffer's reagent, and the total acid with phenolphthalein as indicator in a series of 51 cases, the gastric contents being either that aspirated after the ordinary Ewald test meal, or from the fasting stomach. These studies show beyond question that although, as one would expect, the pepsin and rennin content are parallel in most cases, nevertheless there are so many exceptions to this as to prove clearly that the production of one enzyme may be suppressed or increased without affecting the production of the other; in other words, demonstrating that pepsin and rennin are separate enzymes.

Incidentally these studies also show that there is no relationship between the amount of pepsin and of the free hydrochloric acid or the total acid content,—a fact we have also demonstrated in many cases of achylia as well as hyperacidity, in which cases we have employed the edestin method for the estimation of pepsin in preference to the Mett method. We have always felt that the hydrochloric acid as secreted in the stomach is always of constant percentage, but that the pepsin richness may vary.

(c) *The Significance of the Absence of Hydrochloric Acid in the Gastric Contents.*

We realize that the term achylia gastrica is very loosely used, for, as we noted before, although of a large series of cases studied by us that showed no hydrochloric acid, in the majority the pepsin was absent, in some it was present even in normal amount. Roughly speaking, we use the term to mean no hydrochloric acid in the gastric contents after the ordinary test meal with a total acidity under 12 or 15, and with a hydrochloric acid deficit, although Rehfuss by his fractional methods of study insists that in some of these cases free hydrochloric acid may appear in the gastric contents long after the usual time of extraction of the meal. It was not many years ago that the absence of hydrochloric acid was considered, if not diagnostic, at least extremely suggestive of gastric carcinoma. To realize the error in this point of view and to show that in the vast majority of cases achylia is associated with benign conditions, one has but to mention its presence in a large series of cases. Let us briefly enumerate some of the diseases in which it is frequently found, drawing only from our own cases. We must realize, of course, that it may represent the late stage of an inflammatory process, or an atrophy of the mucous membrane, or a lack of functional activity of the glands, either due to a pure neurosis, to psychic disturbances, to a toxaemia, or to a reflex inhibition from elsewhere, as, for example, the achylia frequently met with during menstruation.

The conditions in which we have met with an absence of hydrochloric acid with peculiar frequency or of especial interest are:

1. The last stages of a chronic gastritis.
2. Gout and arthritis deformans, or perhaps better called chronic infectious arthritis, leading in the first case to the substitution of an acid for an alkaline therapy, and in the latter to the belief held by many in the intestinal origin of the disease.
3. Various infectious diseases—tuberculosis where it is often found, and typhoid fever, in the latter of which in a number of cases we have found a complete achylia following the disease, which may be one of the causes of the gastro-intestinal symptoms often met with, which is probably toxic in origin and not due to destructive changes in the glands, as in many cases after a considerable period of time, in several of our cases more than a year, there was a gradual return to normal gastric juice, and in all these cases the use of hydrochloric acid therapeutically should be advised; sinusitis, pyorrhoea alveolaris—a very frequent cause, probably leading to a true infectious gastritis and being the most potent factor in the gastric dyspepsia and diarrhoea in older people—and tonsillitis.
4. Various intestinal parasitic diseases, especially infection with the uncinaria,—hookworm disease,—though frequently found in infections with tapeworm, round worm and entamoeba.
5. Conditions associated with chronic passive congestion, notably chronic nephritis and myocardial disease.
6. Pernicious anaemia, a group of peculiar interest because of the resemblance of the symptoms to gastric cancer, and because of the view

held by some that the anaemia is secondary, the gastro-intestinal condition primary.

7. Pellagra and sprue—in the latter associated frequently with a concomitant absence of pancreatic secretion, and in each disease a marked improvement of the digestive symptoms often following the administration of hydrochloric acid, in association with pancreatic ferment in the case of sprue.

8. Cancer, not only of the stomach but often of other organs even outside the abdominal cavity, especially in the late stages of the disease.

9. Diseases of the thyroid, and here both in Graves' disease or hyperthyreosis, and myxoedema or hypothyreosis it is often found and is probably the cause of the marked diarrhoea which may be the only symptom of the former disease.

10. Linitis plastica, or cirrhosis of the stomach, probably representing in most cases the conversion of an old ulcer into a malignant condition with marked hyperplasia of the fibrous tissue and very little cellular participation.

11. High grades of ptosis and atony of the stomach, although here hyperacidity or normal acidity may also be found.

12. Chronic gall-bladder disease with and without jaundice where we have found it in a very considerable proportion of cases, and where it may prove of real aid in diagnosis.

13. After sudden shock, violent emotions, worry and overwork.

Truly a large group of cases and very interesting, as it makes one realize under what various stimuli—infectious, toxic, nervous, etc.—the condition may develop, and how difficult it may be to differentiate the true underlying condition. Unlike many others we have not found the presence of pepsin in large amount of much value in differentiating the purely functional from the organic achlorhydrias, for in a large series in which the pepsin was estimated quantitatively by the edestin method we found in the great majority of cases, both functional and organic, the practical disappearance of pepsin *pari passu* with that of the hydrochloric acid. As to the effect of the absence of hydrochloric acid this is very varied, and in many cases difficult to explain, as, for example, the fact that in certain cases it is associated with a diarrhoea, in others with constipation, and in still others with a normal bowel habit. After all, to appreciate what the absence of hydrochloric acid may bring about we must always keep in mind its multiplex functions—its action upon the pyloric sphincter; its rôle in converting the inactive prosecretin into the active hormone of the pancreas, secretin; its disinfecting properties; its rôle in the digestion of the proteins; the essential part it plays with pepsin in the digestion of connective tissue, and its activating power upon the zymogens of pepsin and rennin.

(d) The Study of the Soluble Proteid Contents of the Gastric Juice in the Diagnosis of Gastric Carcinoma.

Boas said a few years ago "attempts to make an early diagnosis of cancer of the stomach are useless—we should be satisfied to make a correct late diagnosis." Perhaps our x-ray brethren will not agree to this, but with a few brilliant exceptions we feel that this dictum is still unqustionably true. Correct diagnosis of late cancer is often very difficult if we have not a palpable tumor, and if we realize, on the one hand, how in a large proportion of cases the growth originates behind the left costal arch on the lesser curvature and is not palpable until a considerable portion of the stomach is involved, and, on the other hand, the very slight diagnostic significance of the lack of hydrochloric acid and even of the presence of lactic acid and of the Oppler Boas bacilli, the diagnostic difficulties are very apparent. Most of these special tests are based on the assumption that the cancer cell in its growth or in its disintegration develops a proteolytic ferment which carries the cleavage of the proteid molecule further than normally met with in gastric digestion. Some of these tests have proven singularly disappointing, as the glycyltryptophan test, for we now know that the saliva contains a substance, possibly an enzyme, which can also split up this substance, while the more complicated tests of Saxl and Salomon, and especially of Salkowski—the increase of the colloid nitrogen in the urine in gastric cancer—are not only too difficult for ordinary clinical study, but, according to our experience, have proven singularly unreliable, far more so than the strictly biological tests, such as the increase of the antitrypsin in the blood. We have for the last few years been much interested in the simple method devised by Wolff and Junghans for determining the amount of soluble proteid in ~~the~~ gastric juice by adding a solution of phosphotungstic acid to graded dilutions of filtered gastric juice, a significant increase being suggestive of gastric carcinoma. The test, however, is obviously only applicable to those cases with no free hydrochloric acid, and is, therefore, not of value in the early diagnosis of the disease. From tests made upon over 200 cases of benign and malignant achlorhydrias in which one could judge with a fair degree of success the correctness or incorrectness of diagnosis either by the operative findings or by the subsequent course of the case, in over 85% the tests gave a correct interpretation of the condition—a large enough percentage to warrant its use as a routine procedure in all doubtful gastric cases associated with achlorhydria, and agreeing in practically all details with the results of Smithies' much larger series from the Mayo Clinic.

(e) Gastrogenous Diarrhoea.

No more interesting group of digestive cases can be found than that of the gastrogenous diarrhoeas, that is, cases of diarrhoea associated with a complete lack of hydrochloric acid in the gastric secretion. It is extremely difficult to determine why some of these cases of achylia are associated with diarrhoea, others not, for in all cases the food must enter the intestines in an unprepared form, in all the bacteria-content of the stomach and upper intestines must be higher and in all the pylorus tends to remain open; and yet the result of therapy and the study of the stool demonstrate that these cases are not purely intestinal in origin. We have been especially interested in this group in determining by the method to be mentioned later whether or no the diarrhoea was due to an associated disturbance of pancreatic function, but a careful quantitative estimation of the pancreatic ferments in cases of achylia, with and without diarrhoea, showed that this is not so (as suggested by Gross of Vienna, but opposed by Ehrmann of Berlin), and, therefore, some other mechanism must come into play. Perhaps in these cases the hydrochloric acid acts as one link in a chain,—a link to be used over and over again in the production of a hormone which has as its object the inhibition of the motor function of the intestine; for the reaction is not a quantitative one, small doses of hydrochloric being quite as effective as large. There is really no more brilliant therapy than the treatment of these gastrogenous diarrhoeas with small doses of hydrochloric acid—to see the symptoms in a case with intractable diarrhoea of years' duration, often of the morning type, disappear with return to a normal stool habit after a few doses of the acid, is almost incredible; and yet this happens in most cases, although obviously to get permanent results the acid must be administered regularly and sometimes indefinitely. Unquestionably certain of the diarrhoeas met with in pernicious anaemia, nephritis, tuberculosis, typhoid fever and its convalescent period, pellagra, sprue, and various neuroses are of this type, and often are markedly helped by acid therapy.

(f) The Quantitative Estimation of the Pancreatic Ferments in Stool and Urine.

Pawlow and his followers have shown in dogs the definite quantitative response of the pancreatic secretion to food stimuli, while Wohlgemuth and others believe that they can also demonstrate a qualitative response at least as regards the carbohydrates. Although incapable of absolute experimental proof it is highly probable that similar conditions exist in man, that is, that there is a definite relationship between the amount and possibly the type of food ingested, and the amount and character of the pancreatic response. Of course, if such conclusions are true, it is essential for clinical purposes that a normal be established.

We have studied quantitatively the diastase in the feces in the hope that by establishing the normal limit, especially the low normal, we might have criteria of value in the diagnosis of organic or functional diseases of the pancreas, determining whether or no in such diseases a definite variation from the normal is constantly found. We have chosen the diastase in preference to the trypsin or lipase because of its greater stability, because of the marked proteolytic action of the bacteria, much more striking than their diastatic action, because practically all the diastase that is secreted into the intestinal tract arises from the pancreas, the amount from Brunner's glands and gall-bladder, the only other sources, in all probability being practically negligible and because it is a preformed ferment and does not require an activator.

We have attempted to devise a method which is simple, practical and exact, and based on physiological principles, and by applying the same method to normal and pathological conditions to draw comparisons of value in diagnosis. In practically all the diseased conditions the diagnosis was verified by operation.

Of course, a great many methods have been suggested as qualitative and a few as quantitative tests of the pancreatic function—Sahli's glutoid capsule, Müller and Schlecht's gelodurot capsule, the study of the stool for large amounts of meat and fat (creatorrhoea and stercorrhoea) after the Schmidt diet, the Volhard method of obtaining the duodenal contents from the stomach by administering olive oil by mouth and the examination of the fluid for the pancreatic ferments, Ehrmann's palmitin test, Einhorn's intubation of the duodenum, A. Schmidt's nuclei test, the Cammidge reaction, and the alimentary glycosuria test. None of these is definitely quantitative, however, and for this purpose the estimation of the pancreatic ferment in the stool suggests itself. Of these ferments the trypsin and lipase are more easily destroyed by bacteria, each requires activation to show its maximum efficiency, the former by enterokinase, the latter by bile; and the proteolytic action of the intestinal bacteria may complicate the findings very markedly.

Of course, in all such estimations the salivary diastase—identical in action with that from the pancreas—must be eliminated, but this is easily done by administering a food in liquid form in which the act of chewing is not called into play. Of the other ferments found in the small intestines—erepsin, peptolytic ferment, nuclease, lipase, fibrin ferment, hemolysin and glucoside-splitting ferment—none appreciably affects the action of the diastase. This action, of course, is the conversion of starch to maltose, the intermediary products being soluble starch, erythrodextrin, achrodextrin, and isomaltose.

As for the methods described for studying the diastase in the stool to determine the pancreatic function, most are based on the same principle,—the conversion of starch into lower products which do not give the characteristic starch reaction with iodine or the determination of the sugar produced by this cleavage by Fehling's solution or some other reagent. Roberts, Strasburger, Wohlgemuth and Ed. Müller—all describe such methods; the results, however, are open to serious criticism because they used different foods and various or no laxatives, and thus rendered possible enormous variations in the diastase content of the stool. Diarrhoea always increases the stool diastase, constipation lessens it, while Ury has shown that of the purgatives, senna really increases the secretion of diastase, while the bitter waters and bitter salts have no such effect. It would seem wise, therefore, to choose a bitter salt as a laxative of choice in these investigations. Enriquez, Ambard, Binet and Durand reported a number of cases in which the digestion of starch was measured by the quantitative estimation of the sugar formed. We, however, regard the Wohlgemuth test for diastase as far more practical than the quantitative estimation of the sugar formed, and quite as free from criticism on theoretical grounds. No discusion of the ferment content of the stool would be complete without a reference to the very extensive and interesting studies of Crohn in this direction. In the case of both duodenal fluid and stool he gives a table of normal variations for the three ferments,—lipase, trypsin, and diastase,—and of these three, he believes trypsin is the most constant. He believes that the method lends itself to prognosticating qualitative and quantitative variations in the strength of the pancreatic external secretion.

In the methods employed by us in determining the normal amount of diastase in the stool, we have tried to eliminate as far as possible all sources of error, and so to standardize the different steps that mistakes would be reduced to a minimum. The patient is given a high enema the night before, the evening meal being a very light one. At 7 A.M. the next day, 750 cc. of milk is given, at 7.30 A.M. and again at 8 A.M. 1-2 an ounce of Epsom salts (Mg SO$_4$), and at 8.30 A.M. a glass of water containing 1-4 of a teaspoonful of bicarbonate of soda. All the stool up to 2 P.M. is saved in a vessel containing two ounces of toluol, and kept on the ice or in a cool room. If less than 400 grammes or cubic centimeters of stool are obtained, an enema of a pint of water is given, as in our experience between 400 and 1100 cc. of stool is the amount to be expected in the individual case.

Barring the inevitable possible mistakes always associated with the gathering of specimens, the possible sources of error are psychic variations in the different patients, differences in their intestinal bacterial flora and variations in the motor functions of their stomach and intestines, but we believe these inevitable sources of error are reduced to a minimum by the method employed.

Of course, the condition of the salts in the stool has also a distinct effect in activating or depressing the diastatic action, but we do not believe that if our technic is strictly followed out it is necessary to dialyze the stool and make our studies from the desiccated specimen.

Preservation of the specimen in a very cold place or on the ice, and the immediate examination of it after the entire specimen has been obtained, is imperative because of the marked effect of variations in temperature upon the ferment, and also because by allowing it to stand we are introducing two variable factors—changes in the ferment due to temperature and chemical changes in the medium and the influence of the varying bacterial flora upon the ferment; and, secondly, the diastatic action of the bacteria themselves. We believe that the wide variation obtained in certain of the investigations is dependent upon the lack of insistence upon certain of these points, and that with a rigorous technic figures as to normal limits are of real value.

From our study on the diastase content, and to a less extent upon the trypsin, of the stool in normal conditions we feel justified in concluding that the stool, if a rigorously exact method is carried out, furnishes a ferment content within definite limits (600 units being the low reading of 20 normal patients in the case of diastase).

While, of course, realizing that this method is not especially esthetic, nevertheless we feel that it is more truly quantitative than the study of the duodenal contents, for in the latter case, there are far too many variable factors, especially the difference in the time the bucket enters the duodenum, and the consequent difficulty of determining at what phase of pancreatic digestion the fluid is obtained, and the varying admixtures of bile and duodenal secretion.

We have also estimated the diastase of the urine in normal and certain pathological conditions, the total amount in the 24 hours varying in health from 15 to 120 units. As to the value of the estimation of the urinary diastase diagnostically, the study of a number of cases of pancreatic and renal diseases has made us feel that the two main reasons why it is not diagnostic of pancreatic disease are, first, because of the widespread distribution of this ferment in the body and the possibility of a vicarious increased activity of other sources of supply in the case of pancreatic disease; and, second, because in various renal diseases there is usually a marked lessening of urinary diastase due to deficient renal permeability. For these reasons, while a persistently low diastase content of the urine if the kidneys are normal is suggestive of pancreatic disturbance, yet the normal figures in our series should prove of far more value in the study of the renal function.

(g) *Diagnostic Value of the Quantitative Study of the Pancreatic Ferments in the Stool.*

Recently we have been standardizing the tryptic ferment also in the stool, although for various reasons it is not so satisfactory as the diastase, especially because it is secreted as a zymogen, and because the end reaction is marked by a white precipitate instead of a sharp color change; nevertheless, so far the findings have usually harmonized with those obtained in the study of the other ferment. In regard to lipase our results have not been satisfactory, possibly due to the fragility of the ferment and the enormous variability of its action due to the varying bile-content of the stool. We have used our method especially in the study of carcinoma of the pancreas and chronic pancreatitis. In the case of the former, carcinoma of the pancreas, we have made the diagnosis in ten cases, subsequently verified by operation or by autopsy, some with jaundice and some without; and the diagnosis was correct in all the cases. In each case there was still no evidence of starch digestion in the tube of least dilution corresponding to twelve gramme units (600 units being low normal), lower dilutions not being studied as we felt that the limit of error had been reached and that we could say that there was practically no diastase in the stool. Enriquez, Ambard and Binet found no diastase in two cases of cancer of the head of the pancreas, verified by autopsy, and Durand none in one case probably malignant.

The only stool in all our studies, except those of carcinoma of the pancreas, in which we found a complete absence of pancreatic ferments was from a typical case of sprue of more than a year's duration, and in this case no one factor played such a large rôle in the symptomatic cure as the administration of pancreatin by mouth, although even now when the patient is clinically well, and has gained over 50 pounds in weight, a return of the diarrhoea may be brought about by withholding the pancreatin for a few days, and the stool studies still show that normal pancreatic ferments are wanting.

Although we have had no such case in our series we should always remember one other condition in which no pancreatic ferments are found in the stool—complete closure of the pancreatic duct or ducts by stone, etc.; in these cases, if the condition is acute, we usually find a marked increase of diastase in the urine.

We have found a diminution but not absence of diastase and trypsin in 11 cases of pancreatitis (true pancreatic cirrhosis as verified by operation), in chronic gall-bladder disease associated with jaundice, and in chronic infectious or wasting diseases of long duration. Ehrmann reported a case of chronic pancreatitis with marked diminution of diastase in the stool, and Durand 3 similar cases. It would thus seem, that in cases of chronic pancreatitis pancreatic ferments while present in the stool are markedly diminished.

We feel, therefore, that if all the controllable factors are standardized, the study of the diastase and trypsin content of the stool should be of real value in the diagnosis of pancreatic disease, especially carcinoma.

(h) *Pancreatic Secretion in Achylia Gastrica.*

According to Starling, "the formation of hormones and their circulation through the blood to the reactive tissue suffices to account for the whole activity of the pancreas, and it is doubtful whether in this activity the nervous system plays any part whatsoever"; this hormone, secretin, of course, being produced by the action of the hydrochloric acid of the gastric contents upon the prosecretin of the duodenal mucous membrane. If this were so, there should be practically no pancreatic ferment secreted in true cases of achylia gastrica, for the accessory rôle in stimulating pancreatic secretion played by water, fats, fatty acids, soaps, peptones, alcohol, sodium chloride, lipoids, and lecithin is minimal. To see whether or not this is so,—in other words, to test Starling's view,—we have made very careful quantitative estimations of the diastase and in some instances of the trypsin in the stool in 7 cases of true benign achylia gastrica, for if it is the action of the free hydrochloric acid upon the duodenal mucous membrane which practically alone calls forth the secretin of the pancreas by converting prosecretin into secretin, then in those cases without hydrochloric acid in gastric contents there should be a marked diminution of pancreatic secretion. In three of these cases, there was a persistent diarrhoea of long standing—a true gastrogenous diarrhoea, while in the other 4 cases the bowels were normal or costive. Our findings were that there was absolutely no diminution in 6 of the 7 cases, while in one case only were the ferments diminished, and then very slightly, thus showing that in the absence of hydrochloric acid some other mechanism is employed to call forth pancreatic activity,—a view also held by Ehrmann from his qualitative studies of the duodenal contents obtained by aspiration of the stomach after oil feeding. After all, the well-known fact that there is a psychic secretion of pancreatic juice, and the numerous observations of Pawlow and others would make one feel, as our results also show, that in pathological conditions at least, and possibly also normally, if the results of Pawlow's and Fleig's experiments are properly interpreted, there is a nervous as well as a humoral method of pancreatic secretion.

(i) *The Influence of Jaundice upon the Pancreatic Secretion.*

We have neither time nor space more than to touch upon certain other findings of interest in the study of the digestive ferments. In studying the effect of jaundice, artificially produced in dogs, upon the pancreatic secretion we arrived at the following conclusions: first, after the ligation of the gall duct and the consequent production of a rapidly developing jaundice there is a marked reversal in the pancreatic juice both as regards amount and ferment richness after the different types of foods; there is more juice with milk than with meat, and where before the trypsin or the diastase showed a definite increase, now a decrease is likely to be met with, and vice versa; and, second, the removal of the bile from the intestine after the previous withdrawal of the major portion of the pancreatic secretion produces in a very short time a rapid loss of weight and strength, ending in sudden death, and emphasizes anew the great importance of the bile as a partial substitute for the pancreatic secretion if the latter is absent or markedly diminished. On the other hand, different conditions obtain in chronic jaundice, and here we find, as we have shown in many cases in human beings, a marked lessening of hydrochloric acid and pepsin in gastric contents, and of diastase and trypsin in the pancreatic secretion. The effect of acute jaundice upon the pepsin curve of secretion has been shown by Glube as similar to our pancreatic ferment curves.

(j) The Effect of Radium upon the Digestive Ferments.

A few years ago when radium and radio-active waters were suggested as cures for many and varied ills, it seemed of interest to study the effect of the emanations upon the digestive ferments. In our first series of experiments we used radio-active substances from various sources, such as radium lead and radio-active ores, while in our second series, carried on several years later with our assistant, Dr. Hendry, we used extremely radio-active water artificially prepared and kindly furnished us by Dr. Burnam from Dr. Kelly's supply. In our first series of experiments the influence of the radio-active substances was extremely slight, and our conclusions were that none of the radium preparations seemed to have any effect upon the autolytic ferment of the liver, although this ferment was activated by lead chloride solution; with diastase the very radio-active D.E.F, possessed an inhibiting effect, while the radium D from emanations had a slight stimulating effect, increasing with the length of time and the amount of fluid used, this ferment being also markedly activated by various salts; with pepsin we found a slight inhibiting effect more marked with the very radio-active D.E.F, although slight in comparison with the inhibiting effect of saturated lead chloride solution.

In our second series of experiments on pepsin, trypsin, lipase and diastase the only effect noted was a very slight inhibition in a very few cases, in the majority of cases no effect whatsoever; our findings thus agreeing with the more recent work of Gudzent and Stoklasa, and in direct disagreement with the earlier work of Bickel, Bergel, Wohlgemuth, and others, who reported a marked activating influence upon various ferments, including the autolytic ferments of the liver, diastase, trypsin, pepsin and glycolytic ferment.

Certain incidental findings were of interest in these studies of ours, as, for example, the remarkable influence of the reaction and of the salt content of the fluid, and the peculiarly stimulating effect of certain inorganic salts, notably, of lead chloride upon that most interesting of ferments,—the autolytic ferment of the liver, first described in 1876 by Salkowski, of great importance in the intermediary metabolism of proteins; verified by Neumeister, Magnus-Levy, and Jacoby, and, according to the last investigator, consisting of two ferments, an alpha- and a beta-protease. This finding suggests a possible explanation for the action of the so-called alteratives, potassium iodide, etc.

(k) Ferments of the Small Intestine.

We have done practically no work upon the numerous and interesting ferments of the small intestines—lipase, diastase (in minimal amount), maltase, lactase, invertase, enterokinase, erepsin, arginase, nuclease, rennin, mucinase, and the various oxydases and reductases described by some, except in an occasional case to verify Ury's findings,—that after certain of the laxatives and purgatives, notably senna, they are considerably increased; but we feel sure that, notwithstanding the difficulties met with, these ferments furnish a very fertile field for study in the hope of elucidating many of the complex problems of intestinal digestion, with the probability of a definite differentiation of a number of quite separate conditions now loosely grouped together under the vague term of intestinal indigestion.

Conclusions.

In this short paper we have attempted to present, although of necessity briefly and incompletely, the results of some of our studies upon the secretions of the digestive tract—studies carried on in the main in the interspaces of a busy clinical life,—laboratory oases, as it were, in the desert of practice; and from this presentation we trust that we have shown that the neglect of the study of the secretory side is most unwise if we wish to have a broad conception of the diseased process in many and varied interesting digestive conditions. From these studies it seems justifiable to draw certain conclusions—some of purely physiological, others of clinical interest. Of the former the most interesting were the demonstration of the lack of influence of the gastric secretion upon the character of the saliva; the fact that a saliva rich in diastatic ferment is secreted during the chewing of inert substances, stimulating neither to the senses of taste nor smell; the independence of rennin and pepsin, the lack of definite quantitative relationship between the pepsin and the hydrochloric acid of the digestive juice, and the proof that in the absence of the normal mechanism of pancreatic stimulation some other mode of calling forth the ferment of this gland, probably nervous in character, is called into play.

From the clinical side, although also of physiological interest, the conclusions which seemed to us to be of interest are the large number of conditions in which an absence of hydrochloric acid in the gastric juice is met, and the importance of the appreciation of this fact both diagnostically and therapeutically; the significance of an increase in the soluble proteid of the gastric contents in the diagnosis of gastric carcinoma; the importance of recognizing the group of gastrogenous diarrhoeas, and the brilliancy of their treatment with hydrochloric acid; the fact that with a rigorous technic there are low normal limits to the quantity of diastase found in the stool, and that an absence of these ferments is very suggestive of cancer of the pancreas.

Thus, although never losing sight of the greater importance of the motor sphere in digestive pathology, and recognizing that the appreciation of motor disturbances is absolutely essential both as regards diagnosis and therapy, nevertheless we feel and also trust that we have shown, that the study of the digestive secretions is not without value; that from it we obtain an insight into the physiology and pathology of digestion not obtainable from motor studies alone; that without this study, many of the most interesting problems in the digestive sphere would remain unsolved or misinterpreted, and that, therefore, it is both unscientific and short-sighted to eliminate from our diagnostic methods the study of the secretions of the digestive tract.

PSYCHIC AND NEUROPSYCHIC AFFECTIONS IN WAR.*

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IT is only since the South African War, and especially since the Russo-Japanese War, that the psychoses and neuropsychoses of war have begun to be recognized and studied.

Among the principal points emphasized by the Russian psychiatrists, such as Jacoby, Chaikewitch, Serge Soukhanoff, Oreretzkowsky, Vladitchke, Ermakoff, Antokratow, and Cygielotrejch, or by the English, such as Stewart and Kay, may be cited: First, the great frequency in modern wars of cases of psychoses and psychoneuroses,—a frequency such that the Russians had to establish at Kharbine and at Moukden, in Manchuria, psychiatric hospitals. Second, the predominance of acute, often transitory, psychoses and neuropsychoses clinically analogous to those resulting from severe accidents. Third, the particular multiplicity of cases of this sort following maritime battles. Fourth, the necessity of psychiatric care for armies on campaign, consisting of improvised hospitals in regions sufficiently remote from the base of operations and from the passage of troops.

The facts revealed by the Russo-Japanese War did not attract sufficient attention. I had, nevertheless, endeavored in my teaching of military psychiatry, and in the latest three editions of my text-book, to point out their nosologic and practical importance.

From the nosologic point of view, I insisted, with Jacoby, on this fundamental characteristic, namely, that "modern land and naval battles by the suddenness, extent and horror of their ravages, act more and more in the manner of cosmic catastrophes, such as earthquakes, which may determine genuine epidemics of psychic disturbance. As in great collective disasters, in fact, one sees terrified and distracted soldiers fleeing automatically, disoriented, unconscious, sometimes hallucinated, no longer knowing what they are about, a prey to those new forms of disease akin to the traumatic and hysteric neuroses of industrial origin." In confirmation, two of my pupils, Laurès and Hesnard, published interesting observations establishing the fact that the psychoses, following the explosions of the *Jena* and the *Liberty*, had manifested themselves especially under the form of mental confusion, or of hysteropathic mental accidents. From the practical point of view, I had insisted, equally with Jacoby, on the organization of a special psychiatric service in case of war. "This is a first step in the course of the psychiatric assistance of armies on campaign. We must hope that the question will not rest there, and that the example given by Russia will be followed by all nations, today especially, when the European people are exposed to very severe and protracted wars.

"The solution adopted by Russia, of special hospitals for the insane improvised at sufficient distances from the field of operations, is certainly the best. In case of need, even special pavilions annexed to ordinary field hospitals would suffice, on condition that their medical direction was entrusted to specialists. The psychoneuroses or psychoses from moral shock, which predominate in great cataclysms and great battles are, in fact, in the large majority of cases, essentially acute, transitory, and curable in a few days. On the other hand, no treatment is better suited to the acute psychoses of all forms than rest in bed. One might, therefore, I repeat, in default of special hospitals, attach pavilions for the insane to the ordinary field hospitals. These pavilions would serve at the same time for the traumatic insane and for the post-operative, who would evidently be more numerous in the circumstances of which we speak.

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* This article represents a translation of fragments from an original and hitherto unpublished manuscript prepared by the author in November, 1914, as a report to the French Minister of War from the Psychiatric Clinic of the Military Hospital at Bordeaux, France.

"It is an organization of this sort which Professor Simonin of Val de Grâce also recently urged in his conference of December 13, 1912, with the federal union of reserve and territorial physicians, on psychoses of wartime and psychiatric aid in the field."

Real war broke out before the psychiatric aid which we had been urging for nine years had yet been organized. I cannot say whether the English, Russian, German and Austrian psychiatrists with whom my colleague Tactet and I had discussed this question of military psychoses at the International Congress on the Treatment of Insanity, at Berlin, in 1910, have practically solved this problem, or in what way. It would be of importance to know this, for already, in recognized works, military physicians, such as Stier of Berlin, Drastich of Vienna and Kay of Bristol, had insisted on the treatment of mental diseases during the war.

Be that as it may, from the beginning of hostilities in August, 1914, Dr. Pouchet, director of the health service of the eighteenth district, understanding the necessity of doing something in this regard, established the care of cases of psychoses and psychoneuroses among soldiers in a central psychiatric service, supplied by patients coming from other sanitary organizations of the district, who were informed by circular. This central service is located at the military hospital at Bordeaux, directed by my colleague and friend, Dr. Salesses.

The cases which I have observed up to this day, December 31, 1914, to the number of 150, may be divided into two principal categories. First, the cases of psychoses in soldiers who have not been under fire,—ordinary, common psychoses, merely supervening on the occasion of war (disequilibrations, degenerations, alcoholism, general paralysis). Second, psychic and neuropsychic affections in soldiers returning from the front and induced directly by battle. Of the former group there were 62 cases, of the latter 88. It is this latter group of cases which I wish to examine briefly in the present study.

I. PSYCHIC AND NEUROPSYCHIC DISTURBANCES IN BATTLE.

Of 88 cases of psychic and neuropsychic disturbances in battle which I have hitherto observed, 50 are properly psychic and 38 neuropsychic.

PSYCHIC DISTURBANCES.

Traumatic psychic disturbances, whether proceeding from a moral, purely emotional traumatism or from a physical traumatism, are represented essentially by symptoms of mental confusion with or without hallucinatory oneirism, that is to say, by the exact symptoms which characterize the psychoses of intoxication and of infection.

This opinion, which is in accord with the facts observed by the Russian psychiatrists in Manchuria, and with those resulting from the explosion of the cruisers *Jena* and *Liberty*, or from the recent earthquakes in Sicily, is again confirmed by the facts of actual war, in which the two principal psychic disturbances established by us have been, hallucinatory oneirism and mental confusion.

Hallucinatory Oneirism.

Hallucinatory oneirism has never been lacking in the 88 cases affected with psychic or neuropsychic disturbances following battle. In this regard, I may remark that there are very few wounded returning from battle who do not dream more or less of the fighting. I have questioned a large number at random and the majority, even those whose sleep was absolutely calm before, have declared that on their return from the front, and for several nights at least, they have had dreams of this sort. This is very natural and need occasion no surprise, but it is not a question of ordinary dreams without pathologic character. The morbid dream, which alone constitutes oneirism, begins only when it imposes itself as a reality,—when the sleeper really lives it,—and this oneirism, which we see participates in the second stage of hypnosis, may, like it, pass from the dumb dream to the dream in action. It is of this living dream, this hallucinatory oneirism only, which I wish to speak.

It has never, I have said, been absent in our patients with psychic and neuropsychic disturbances. The events and incidents of the battle which serve as its theme are variable. There is the bursting of shells, the shrapnel, the fusillades, the charges, the evolutions of the aeroplanes, the life in the trenches, the spectacle of the wounded and of the dead. Sometimes the scenes are multiple in the same patient, and this is most frequently the case. At other times the scene is single, always the same, and it consists then in a habit of painfully living over again the terrifying circumstances of the wound or of the emotion of shock.

The degree of hallucinatory oneirism varies equally among its subjects. Sometimes the vision is simply painful and transitory. Sometimes it seizes the sleeper to such degree that he literally lives it and it continues even into the day in what has been properly called a prolonged dream. Several of our patients of this grade wave their arms, seem agitated, and talk in their dreams, allowing significant exclamations to escape.

If the intensity of this hallucinatory oneirism marks the profound influence of the emotions of a battle on soldiers, it contributes, for its own part, by a sort of delayed shock, to maintain in a high degree the impressionability of its subjects. Happily its action is only temporary, the duration of the hallucinatory oneirism itself being but transitory. I have rarely seen it last more than two weeks, even in the most acute cases. Ordinarily it disappears at the end of several days, after which, sleep again becomes calm and restorative.

Under the circumstances and conditions of examination it has been impossible for me to verify here the clinical law of the relation between the urine curve and the oneiric curve which we have previously established, but in various instances I have been able to establish the diminution of the total amount of urine in patients at the acme of the oneirism and its augmentation continuing to the crisis, to the moment of the disappearance of the psychic disturbance.

I think I have no need to add that the hallucinatory oneirism of soldiers returning from fire has nothing to do with ethylism. All my patients, or practically all, were absolutely sober. I think, moreover, I have made due allowance for this error, too long a time having elapsed for painful, terrifying occupational nocturnal hallucinations to be the characteristic index of alcoholic intoxication. In reality, they may manifest themselves exactly thus in any metabolic disturbance of the organism, produced either by an intoxication or by any sort of infection, or, what seems equivalent, by an emotional shock.

An interesting fact in this regard is that since the declaration of war, hallucinatory oneirisms of battle have appeared, not only among soldiers who have actually been present at combats, but also among alcoholics, whether soldiers or not, who have remained at their homes or in garrisons. A territorial, a chronic alcoholic, came to me at the psychiatric clinic of the military hospital with a note from Major Guérin, giving the details of his nocturnal hallucinations. He saw automobiles arriving, then a German army of 200,000 men, and, in the rear, Russians and French, as well as some Russian vessels. He was then present, he said, at a battle. He fired at the Germans as well as at some aeroplanes. He then saw the domestic animals of his farm.

These hallucinations, which lasted three or four nights, occurred notably at the moment when this territorial was in camp near a railway. He declared, even on coming to himself, that he had really fired at the enemy and at the aeroplane which he saw, but had fired blanks, since he had no cartridges.

However it may be, one sees that the events of war and of battle may supervene among alcoholics, even non-combatants, to give a special form to their oneiric hallucinations. This is only a further example of a very general fact that the events of the moment often intervene among the insane, to orient and color their delirium and their hallucinations.

Mental Confusion and Amnesia.

Together with hallucinatory oneirism, the predominant syndrome in the psychic disturbances which we are studying is the syndrome of mental confusion. Although constituted by its habitual elements of obtusion, disorientation, amnesia, agitation or torpor, this mental confusion differs in certain points from the type which supervenes, for example, in the course of acute infections. It has a sudden onset like the traumatic cause which produces it; it is not habitually of long duration; and it manifests itself above all by the symptom of amnesia, which is its essential characteristic. The mental confusion produced by battle, therefore, is one of the mental confusions of amnesic type like that of insolation, of polyneuritis and of eclampsia.

Accentuated though the amnesia may be, and exclusive though it may appear in such a case, it does not, however, represent the entire morbid state; it always attaches itself to a mental confusion, perhaps little apparent on account of its slight and transitory manifestations of obtusion and disorientation, but nevertheless real. It even coexists often, as we shall soon see, with hallucinatory dreams, that is to say, with the oneiric element of mental confusion.

The amnesia of cranial traumatisms, like that of insolation or of grave infections, has well-known characteristics. In its typical form it is at the same time lacunar, retrograde, anterograde and actual.

The amnesia which results from battle may present itself under classic aspect. In slight and moderate cases it consists above all of an impression of recollections which extends to a greater or less period from the time of the traumatism, and from the consecutive time. Except for the cases accompanied by loss of consciousness, it is not a complete night, but a more or less sombre twilight and dysamnesia, rather than an amnesia.

That which has appeared to me above all to characterize the amnesia following battle, and to differentiate it in some way from similar amnesias, is that it presents a singular tendency to manifest itself in the complete or total form.

Total amnesia, that is to say, that which extends over the entire life and allows nothing to remain in the subject's mind,—neither his name nor his birthplace nor his age nor his profession, nothing, in a word, of the events through which he has previously lived,—is extremely rare.

I have just observed three very clear cases of this condition among soldiers returning from battle,—two officers and an adjutant profoundly shocked, but not wounded. On their arrival, all three were incapable of furnishing the slightest information about themselves or their families. The adjutant, who had come from Cambrin in a state of extreme hebetude, which slowly dissipated, was totally ignorant about himself and when he was asked, for instance, if he were married, he looked at his wedding ring and said, "I must be, because here is my ring."

This total amnesia creates in the patients a strange situation from which they suffer more or less acutely. The adjutant cited above reflected, scratched his head when he was questioned and then replied in an irritated tone, "That tires me. I feel that I am going mad."

It is a curious thing that when all the recollections of existence have disappeared there is one which may survive, namely, that of the event which produced the shock. Sometimes even the recollection of this event crystallizes itself in some fashion in the brain, and objectivates itself there to such an extent that from being an agonizing and almost an hallucinatory fixed idea by day, it becomes at night a terrifying hallucination, reproducing itself always during sleep.

Besides the cases of mental confusion and amnesia with more or less marked hallucinatory oneirism, I have observed much more rarely other psychoses among men returning from battle: four cases of anxiety of the melancholic type, four cases of maniacal excitation, and five cases of delirium of vanity among the sick, consisting in auto-attribution of ranks and of imaginary decorations or in circumstantial inventions, notably infallible procedures for the destruction of hostile trenches, with the desire to present the invention to the commander-in-chief or to the minister of war, and with a distrustful fear of being dispossessed of it; but even in these subjects there existed the amnesia and the hallucinatory oneirism, which specifically constitute the fundamental psychic disturbances.

Etiology.

The very minute etiologic investigation which I pursued in every case demonstrated that in psychoses of battle, as elsewhere, the predisposing causes did not lose their effects.

The predisposition observed in patients affected with mental confusion and hallucinatory oneirism is not an hereditary predisposition. We shall see in the second part of this study concerning the ordinary psychoses, that the sons of the insane and alcoholics and, even more, those who had previously had an attack of insanity, have especially fallen or relapsed into illness either at the declaration of war, during the time of mobilization, or in the early days of their service, that is to say, before being under fire. It appears that there was a first selection natural and realized immediately among those who were hereditarily predisposed. On the contrary, there are very few of these predisposed subjects among those returning from the front who have passed under my observation. These were merely disoriented persons whom the first agitations of the early war had not been sufficient to render insane, or for whom to do so required the shock of battle itself. Such notably were those affected with trench delirium, to whom I shall make future reference.

The individuals in whom the psychoses of battle have supervened, were almost all, and above all, emotionally predisposed, impressionable, nervous, even neuropathic, of whom two had previously had nerve crises of the hysteric type.

This particular predisposition, a true emotional constitution, in my opinion, dominates and illuminates the etiologic mechanism of the psychoses of battle, which are, then, essentially psychoses of emotional origin. This is proved not solely by the habitual existence of the emotional predisposition among the patients, but also by the existence of emotional shock as a principal and constant occasioning factor.

A priori one would be tempted to believe that this occasioning cause must be the physical traumatism, the wound and the consequences of every sort which it may entail. This is not so. Of my 50 patients only 22 had been wounded, the 28 others had not received any wound or contusion. On the other hand, not one of them had been without moral and emotional traumatism.

Moreover, the reaction is not delayed and the psychic disturbance appears rapidly, brusquely, either under the form of confusional agitation, driving the patients to rush unconsciously in all directions, sometimes even towards the enemy, crying out and brandishing their rifles, or under the form of inert, passive, catatonic stupor with sometimes more or less profound reactions on the organism.

I observed only a single case of psychosis of truly surgical origin in a man with a wounded hand, with suppuration and fever, who, during this complication, some time after his return from battle, presented an hallucinatory battle delirium with slight symptoms of confusion. The delirium disappeared immediately after incision, and extraction of the bullet. That which provoked the psychosis, therefore, or rather the psychic disturbances of battle, as we have seen and observed them, is essentially an emotional shock of the most violent type in impressionable individuals of a nervous temperament. Of course, physical and moral fatigue, long marches, perpetual alertness, the insomnia of life at the front, prolonged inactivity in the trenches, are all circumstances which, by diminishing the resistance of these subjects, favor the action of emotional shock. It is the same with antecedent diseases, particularly, of course, the intoxications and the infections, latent or chronic, such as ethylism, paludism and tuberculosis. The richest and most durable hallucinatory oneiric delirium that I have observed, was that of two officers affected, one with malaria, the other simultaneously with malaria and tuberculosis.

It is not without interest, from the point of view of age and military status, to remark that of our 50 patients, 29 belong to the reserve, 8 to the active force and 13 to the territorials, and that of this number, there were 35 private soldiers, 10 officers, two adjutants, two sergeants and a corporal. I may add that of the three affected with total amnesia, one was an adjutant and the other two were officers. It appears then, without establishing percentages, that the psychic disturbances of battle affect preferably men of the reserve and show themselves intense, especially in the amnesic form, among officers.

Diagnosis, Prognosis and Treatment.

The important point of diagnosis concerning the psychoses of battle consists in differentiating them from the ordinary psychoses, that is to say, from the manias. This diagnosis has a capital importance, for it involves at the same time prognosis and treatment.

If it is a question of mania, the attack is serious. It will be long, perhaps incurable, and necessitates the commitment of the patient. If, on the contrary, it is a question of a psychosis from mental shock in the form of mental confusion, amnesia, or oneiric hallucinatory delirium, the cure is almost certain in a relatively short time and there is no need of commitment, except in extraordinary cases, and if it is a question, for instance, of manic-confusional associations.

From my point of view, it is a serious error, capable of doing great harm at the same time to the patients and to the army, to regard these cases indiscriminately as insane, and to commit them all without observation and previous examination to an insane asylum. These patients, who are but momentarily overturned by an emotional shock, are no more truly insane than those who present stupor, confusion or transitory delirium under the influence of typhoid fever, pneumonia, uremia or a surgical traumatism.

One has no right to inflict the grave measure of commitment on officers or soldiers who return from battle in a temporary state of confusional torpor, or of terrifying hallucinatory oneirism, and who, some weeks later, perhaps, will be in a condition to resume their place in the ranks. That is why, in modern wars, particularly in one so severe and so long as the present, there is need of a military psychiatric service. I do not know whether such a service exists elsewhere, but it should do so, for its importance is capital; moreover, it would be easy to organize, even if only in a simple and rudimentay fashion as'at Bordeaux.

It would be sufficient, in my opinion, at least for the moment, to establish a psychiatric centre at the military hospital at the seat of each division of the health service. This psychiatric centre, wholly analogous to the delirious wards existing at Bordeaux and Paris, or to the neuropsychiatric services established in 1900 in the marine hospitals, should be composed primarily like them of several cubicles or isolation chambers for the violent requiring observation, and an open ward for the calm and inoffensive. These two parts of the service, the cubicles especially, should be, so far as possible, on the ground floor and not far from one another.

This central service should receive not only subjects with psychiatric disturbances from the military hospital itself, but also those of the temporary and auxiliary hospitals of the city and of the neighboring regions. As for the wounded, they may, according to the nature and degree of their psychic disturbance, either remain in surgical wards, or go on to the psychiatric service and there be dressed by the hospital surgeons.

It is indispensable to entrust the psychiatric service to a specialist, supported by at least one assistant and by a competent personnel of attendants whom he shall train. The mobilization, which has placed at the disposition of the directors of the health service a large number of psychiatrists, would greatly facilitate this arrangement.

The function of the physician in these regional centres of psychiatry is at once delicate and manifold. It consists essentially first in receiving all soldiers affected with disturbances predominantly psychic, observing them, and establishing a diagnosis at once rapid and exact; second, in referring without delay to the neighboring insane asylum those affected by mania, by the common psychoses arising on the occasion of war; third, in treating and curing as quickly as possible those capable of rejoining their commands in a few weeks and in forming, on the other hand, a suitable decision in the cases of those more severely affected, particularly those presenting confusional associations.

It may happen that the psychiatric service would receive with the label "psychic disturbance," soldiers attacked by acute infectious diseases. Personally, some time ago, I recieved five in the course of typhoid fever, of whom two came from more or less distant military hospitals in a fairly grave general condition. One ought not to impose a journey on a typhoid patient, especially from one department to another, because he is delirious.

As for the diagnosis between an attack of insanity and a delirium symptomatic of acute infectious disease, the differentiation is relatively easy. It is sufficient to recall that one must think of something other than insanity, and consequently employ every measure of diagnosis every time that a delirium breaks out abruptly; if it presents itself under the form of mental confusion and nocturnal hallucinatory oneirism; if it reaches its maximum quickly with stupor or agitation; if it is accompanied by diminished urinary secretion; and finally and above all, if there is fever.

It is obvious that the specialist in charge of the central psychiatric service should, at the same time, fulfill the functions of expert in the war council of the region, these functions being in time of war more important and active than ever. It is thus that affairs have been organized at Bordeaux since the beginning of hostilities.

II. NEUROPSYCHIC DISTURBANCES.

The neuropathic disturbances of battle are not easily separated, it appears, from psychic disorders properly so called. Just as the latter, in effect, as we have seen, are accompanied by neuropathic disturbances, notably hysteroid crises, so the neuropathic disturbances are accompanied almost constantly, especially at the outset, either by a certain degree of mental confusion or hallucinatory oneirism or, more often still, by fixed ideas, obsessions and phobias. It was thus in the case of the 38 patients who passed under my observation. On the other hand, these neuropathic disturbances have, in themselves, the closest relations with the psychic condition. They deserve, therefore, the denomination of neuropsychic disturbances under which they are here designated.

Epilepsy is rare. Neurasthenia is more frequent, especially among officers. Already existing or predisposed, it manifests itself with them under the most typical form of exhaustion neurosis with physical and psychical adynamia, apathy, aboulia, and nosophobia. Several of these officers were already fatigued before the war, exhausted by long residence in colonies, and their potential was in advance incapable of enduring the exceptional expenditure of strength required. Some gave way from the outset, manifesting a most vexatious inertia; others, after having given all that they could, sometimes with great brilliancy, collapsed in absolute exhaustion, incapable thenceforth, and ashamed of their incapacity.

As for hysteria, alone or associated with neurasthenia, it is this, or at least that which we are accustomed to classify under this nosologic label, which has largely dominated the scene. The most varied, unusual and peculiar cases may be observed: syndromes of tremor, trepidation, spasm, tic, convulsions, impotence, anesthesia, paralysis, urinary incontinence, blindness, deafness, mutism, somnolence, delirium, sometimes transitory and disappearing at the least suggestion, sometimes tenacious and resistant to the highest degree, accompanied, or not, by classic hysteric attacks recurring daily at the same hour. Almost always these manifestations were met in neuropaths of whom some had already previously had nervous accidents.

For the moment, I only note these facts, and will limit myself to speaking a little more in detail of another syndrome, which, from its frequence, its symptomatology and its relations, seems to me to constitute in some sort the type, or one of the types, of the psychoneuroses of battle. This syndrome is functional paraplegia or pseudoparaplegia.

Functional Paraplegia.

My attention was first drawn to these facts by Inspector-General Delorme, who, on September 13, 1914, asked me to visit and examine at the temporary hospitals Nos. 4 and 78, directed by my colleagues, Drs. Bergonié and LaGrange, a subaltern and a soldier, presenting the effects of explosion, whose nature needed to be determined, this examination presenting great importance from the point of view of prognosis. Subsequently, I observed one after another, six analogous patients, and it is the result of this study that I wish here briefly to summarize.

From the point of view of motility, patients of this sort are all alike. They have at first a more or less complete disability of the legs, preventing them from walking, and even, in certain cases, from standing upright. Nevertheless, the majority have retained their muscular force, as one may determine, by the resistance which they are capable of offering to movements of flexion, or extension imposed on their lower extremities. They can, also, when extended on their bed, raise their feet to a certain height, when the pain which they feel in various points of the body permits it. Only one at his arrival had his legs absolutely inert, and was obliged to take them in his hands to swing them about.

The gait is characteristic. At first, the patients are obliged to lean on someone's shoulders in order to advance, their legs do not bear them, and if they are not supported, they stumble and fall. Then by degrees they succeed in holding themselves upright and, without their feet leaving the ground, dragging them one after another on the floor, supported by the sides of their bed and surrounding furniture, or on two stout canes, which they do not dare to give up, they walk very quickly with efforts of the trunk and arms to aid them.

Cutaneous sensibility is more or less diminished, especially in the lower extremities, where it is at times completely abolished.

The reflexes are variable. In a general way the tendon reflexes are preserved, sometimes even exaggerated, while the cutaneous reflexes, on the contrary, are very slight.

I have not observed in my patients either trophic disturbances or paralysis of the sphincters. In two, there occurred temporary anuria and obstinate constipation. There are almost always headache and variable pains, notably in the lumbar region and in the legs, increasing under the influence of attempts to walk and augmenting, in turn, when they are more acute, the difficulties of locomotion.

In seven out of eight cases, I was able to have an electro-diagnosis by Professor Sigalis and Dr. Nancel-Pénard. In all, the examination showed complete absence of reaction of degeneration; it showed qualitative modification of electric irritability and the existence of simple, quantitative variations, most often with diminution of faradic irritability for the muscles of the antero-external region, either of one leg or of both, more rarely for the muscles of the thigh.

In fact, one does not observe in these cases any sign of organic lesion, and the diagnosis of functional paraplegia appears self-evident. This diagnosis, I insist, is applied solely to the category of cases which I have observed. Without doubt, there exist also, between the functional paraplegias and the organic paraplegias, mixed cases; that is to say, cases of association in diverse degrees of nerve alterations and of neuropathologic troubles, as is so frequent in neurology.

The evolution of the malady is ordinarily very slow. Either the disability continues to amend, but in a rather imperceptible manner, or else it remains almost stationary, with slight increases and diminutions, with moments of improvement followed by abrupt relapses on trifling cause, such as pain in the legs, in the back, in the head, or a simple obstinacy, with tendency in each one to adopt a mode of gait determined, and more or less invariable.

Of my eight patients, a single one rejoined his command, still not cured. Of the seven others, two are making progress, but still rise with difficulty from a chair and can hardly walk without support; four are better one day and worse the next; and one is still at the same point, and drags his feet on the ground as at the first day.

In short, incomplete cure in one case, very slight amelioration or almost stationary condition in all the others. This at the end of two months is the situation in my patients, in spite of the active internal and external treatment which has been employed with strychnine, tonics, massage, electrotherapy and hydrotherapy.

The etiology deserves here particular attention. One would be tempted at first to attribute the principal rôle to a special action exercised in the explosive zone of bombs, and an action produced either by the wind of the projectile or by the sudden displacement and rarefaction of the surrounding air, or by the liberation of toxic gases, or by the raising or throwing down of the body, sometimes even with loss of consciousness following and capable of determining true nervous alteration. I believe, in accordance with the facts which I have observed, that this is not the case; for besides the actual symptoms of the disease which make an organic lesion unlikely, there are other reasons of an etiologic nature, which in themselves would suffice to permit this diagnosis to be abandoned.

The principal one of these reasons, evidently peremptory, is that the patients affected with this form of paraplegia have not always been found in the explosive zone of a bomb. Two of our men, out of eight, had been merely and slightly wounded in the foot with a bullet. Moreover, in one of these cases, the paraplegia did not supervene until three weeks after his return from the front to the hospital, when his wound had almost healed. Nevertheless, the clinical manifestations were identical in all the cases. There was the same characteristic disability of the legs and shuffling gait. We must, therefore, seek elsewhere, if not the sole cause, at least the principal cause for this singular syndrome.

This cause, in my opinion, admits of no doubt: it is, again, emotional shock. Not only has emotional shock never been absent in our patients, but one learns that in all it has played the essential rôle, whether they have been overcome by the nearby explosion of shell, or wounded by a bullet, whether overcome immediately, or after an interval.

A final proof establishes the certainty that these patients are the victims of their emotionality: it is that this same emotionality persists, and dominates the picture during the entire course of their disease. That is why, when they wish to walk, they hesitate, tremble and are apprehensive, as in the astasia-abasia phobia. It is that which, by reason of their suggestibility, holds them under the menace of a fixed idea of disability, of paralysis, of incurability, as in sinistrosis, of which cases of this sort are, at bottom, only a variety. It is this, finally, which in almost all determines, at the same time as the nervous disturbances, the more or less marked psychic disturbances of confusion, amnesia and hallucinatory oneirism. From this, one can explain perfectly the evolution of this functional paraplegia, entirely subordinated to the emotional mentality of the subjects, ameliorating or growing worse with it, capable even of prolonging and fixing itself indefinitely, when it is associated with some auto-suggestion, some underlying, fixed idea.

I cannot here pass over in silence the very interesting experiences of Dr. Moulinier, on the one hand, upon the prolonged apnea of vagotomized animals exposed to the action of a sudden detonation; on the other hand, upon the psychic and nervous disturbances presented by dogs subjected to the influence of a violent explosion. It is a peculiar fact that certain dogs present psychic and nervous disturbances, recalling those which we have just described, particularly hebetude, pantophobia and sluggishness of gait in the hind legs not extending as far as paraplegia. It is well to add that in these dogs, which died at the end of three or four days, autopsy revealed no microscopic lesion of the nerve centres, nor any organic disorder. Hence, the conclusion of the author, identical with ours, that it is highly probable that the disturbances observed are purely functional and develop only in predisposed subjects.

In conclusion, I believe that functional paraplegia following battle must be regarded as the effect of a violent emotional shock. It is to be recalled, moreover, that functional paraplegia of emotional origin is already known to pathology and that cases were cited, especially by Déjerine, Babinski and Sollier, in the course of the memorable discussion on the rôle of emotion in the genesis of neuropathic and psychopathic accidents, which took place in December, 1909, at the joint session of the Societies of Neurology and Psychiatry, at Paris.

I may add that there is something comparable in confusional psychosis and particularly in the amnesia produced in the same conditions. These are, in my opinion, two morbid manifestations of the same emotional shock under the form of a phenomenon of arrest, of inhibition, with this difference: that one affects the psychic functions and the other the medullary functions, the two, moreover, as we have just said, being capable of co-existence.

What is difficult to explain is the reason why, when the emotional shock of battle acts on the system, it translates itself preferably into a functional paraplegia. One commonly says of an individual overwhelmed by a violent and sudden moral traumatism that the emotion has taken him off his feet. This familiar phrase is very exactly applicable here, but does not explain why the nervous shock of battle customarily and, so to speak, systematically, affects only the legs and not the arms.

Doubtless it is simply because intense emotions react particularly on the lower extremities in man, as in animals, by reason of their notably lower resistance to various inhibitory agents, but I am far from declaring, the more so since the number of cases which I have observed is small, that this is the rule, and that functional inhibition never affects the upper extremities.

There remain two points to examine. The first is that of the frequency of functional paraplegia as a neuropsychic accident of battle. I should be disposed to believe that this accident is relatively frequent, for it is by chance and without search that I have been able to observe eight cases. Moreover, three similar cases, wholly identical, have been referred to me by Dr. Moulinier, Dr. Drivet and Dr. Bernadou, bringing the number of observations of this sort to eleven.

I should not be surprised if this accident which, if I may judge by my cases, seems to be found chiefly in soldiers of the active force and in young reservists, were an accident of the beginning of the war, becoming less and less frequent in proportion to the marvelous adaptation of soldiers to the terrible effects and circumstances of war. The eleven cases of functional paraplegia which I have cited all date from the month of August or the beginning of September, 1914. Personally, I know of no more recent cases.

The second point to be examined is that relative to the disposal to be made of cases of this sort from the military point of view. This point, as was indicated at the outset by Inspector General Delormé, is very important, so important that, before inviting or advising a decision relative to soldiers affected with functional paraplegia, I have considered it a duty to follow them closely and for a long time. Even today, at the end of three months, I am not decided and still hesitate.

Considering only the proved fact of so marked and so long a disability of the leg, which threatens to become permanent, a single solution seems to be imposed; namely, the workhouse. Regarding it more closely, things are less simple than they appear. Functional paraplegia due to emotional shock of combat is, I repeat, a true sinistrosis. Like sinistroses which frequently disappear after the decision of the court, it has, therefore, a great chance of disappearing also. This is vexatious, the more so, that among soldiers everything is known, repeated, and imitated and this, therefore, cannot fail to multiply cases of this sort, at least to influence their evolution and prognosis. What, then, is to be done with these cases? It would be very imprudent to endeavor, in spite of their non-cure, to send them back to the front, not merely because their condition would infallibly become aggravated there, but also because they are, at bottom, nervously predisposed and even if they supersimulate, if they add voluntarily or not to their morbid manifestations, are none the less sick, delicate, fragile, that is to say, for the greater part, soldiers of inferior quality.

On the other hand, one cannot think of keeping indefinitely in a military hospital where, in time of war, movement ought to be as rapid as possible, an unfortunate cripple destined in the end to weary the most enduring patience. Moreover, placing one of these nervous wrecks in a workhouse is liable to provoke imitators. How much more susceptible of contagion in an institution of psycho-neuropaths, the spectacle of this infirmity of so pitiable an aspect! I have proof that my patients make less progress the more one sympathizes with their disability, and proofs that, unconsciously or not, they react on one another; and I might cite those of my pseudo-paraplegics who have a nerve crisis for the first time after having seen a hysterical attack.

The best solution of this difficult medico-military problem would be that of parole under observation, like that adopted by the law in industrial accidents. But in time of war there is no leisure to wait, and temporary discharge, like renewable convalescence discharge, is not of a nature to solve the difficulty. Perhaps it would be best, after all, for the purpose of suppressing all possibility of sinistrosic auto-suggestion created by the prospect of complete liberation, to keep these subjects in the army, giving them, if possible, an employment compatible with their morbid condition. It is obvious, moreover, that here, as always in medicine, it can be a question only of kind, and that each case, after examination, must be disposed of according to indications.

In conclusion, it should be said that subjects affected with neuropsychic disturbances should be separated from other patients and placed in a special neurologic or neuro-psychiatric service, in accordance with local organizations, reducing to a minimum the chances of intermental action, that is to say, of reciprocal contagion.

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DRUG ADDICTION AND MODERN METHODS FOR ITS CONTROL.

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SINCE the federal and state governments have officially recognized the gravity of the narcotic-drug evil, and have enacted laws prohibiting and penalizing the indiscriminate sale and the habitual use of such drugs, the question of cause and the control of drug addiction came to the foreground.

The Harrison and state anti-narcotic laws have been responsible for the active and vigorous campaign against the habit-forming drug evil, the crusade being headed and conducted by local police and federal authorities. The conspicuous activity of these officials has overshadowed the real nature of the evil by lending to it a criminal aspect, thus branding narcomania with the stigma of crime and prescribing a penalty for the offence.

For years the drug menace has been permitted to flourish more or less unchecked until it has become so deep-rooted as to be ineradicable. Suddenly our legislators were awakened from their lethargy by the alarming spread of the addiction in this country, with the result that law upon law, intended to uproot the evil, has been inscribed on the statute books; all of which though well intentioned, have failed as yet to strike at the core of the trouble.

Although our laws forbid habitual indulgence in and the indiscriminate sale of habit-forming drugs, none provides a remedy other than the penal institution. As a result drug addiction has failed to attract the merited attention of the medical profession, which regarded it outside of its field of investigation, and unconsciously coincided with the penologist that drug-addiction is purely a social evil and should be dealt with by punitive measures.

Those who come in professional contact with the narcomaniac are convinced that drug-addiction is a definite disease having a well defined symptomatology and an indefinite pathology. Indeed, the symptoms of abstinence in almost all cases appear with regularity, in classical order, and so constant as to constitute a definite disease condition which may be easily recognized by the train of symptoms it represents.

Granting, therefore, that we are dealing with a definite disease, the question of susceptibility, cause, and treatment presents itself for consideration.

The question why men and women indulge in narcotic drugs is as yet unanswered. The combined researches of the psychologist, the sociologist, the alienist, and the criminologist have not been productive of a satisfactory explanation. It is said that men drink alcohol and indulge in narcotic drugs because they have an instinctive desire for some form of stimulation, and for the same reason indulge in tea, coffee, and tobacco. Not always are habit-forming drugs used to stimulate sluggish mental faculties or to slow down an overactive mind. In either case, when so used, the element of time and protracted use soon reduces, and ultimately destroys, the efficacy of the drug, both as a stimulant and as a depressant, and the individual takes it thereafter to maintain a normal mental and physical tone. Finding himself in the throes of a permanent habit, the addict uses narcotic-drugs as a connecting link to join the break, which his habitual indulgence produced, in the chain of normal mental and physical functions.

The continued gratification of a craving for artificial stimulation establishes in the habitué a vicious circle of disease, poverty, crime, and punishment, each one following the other in sequential order, and reacting upon each other until a break in the continuity of the circle is brought about through abstinence. Abstention brings on a series of mental and physical disorders which require the restraining influence of a normal will-power, the lack of which compels the user to resort to drugs in order to obtain relief. Thus the habit becomes deep-rooted, the vicious circle continues to operate, the addict develops into a pathetic figure, and is finally reduced to a state of mental and physical deterioration.

The opportunity to study the addict, to discuss with him every angle of his addiction, to see him leave the hospital apparently cured, and to see him return repeatedly for readmission to the institution as a relapsed case, in extenuation offering a variety of plausible excuses, is afforded in the out-patient department of the Norfolk State Hospital where alcohol and drug inebriates apply for treatment. Close observation of these cases before and after treatment suggests that addicts become such because of an inherent or acquired mental weakness, and that in most cases it antedated their habitual indulgence in habit-forming drugs. In other words, it is the neuropath and psychopath who seeks in narcotic-drugs the missing link in his chain of normal functions, the restoration of which makes him feel "just right." With this contention in mind the main reason for our inability permanently to cure a fully developed drug addict becomes obvious. Even the widely advertised "quick cures" have failed to reduce the number of drug users and to make even a lasting impression upon the patient.

Those who have to treat addicts appreciate the futility of relying wholly on the innumerable pharmaceutical remedies so widely and variedly employed in combating the narcotic-drug habit. Successful treatment does not end with the discharge of the patient from the hospital. The real struggle begins at that stage, and becomes more intense and trying with each succeeding day.

Failure permanently to cure drug addiction is due to three powerful influences which assail the patient after treatment and discharge from the hospital. One, the distressing symptoms of abstinence, which gradually reappear and react upon the patient's power of self-control, destroying the stability of purpose that has been inculcated in the patient during his stay in the hospital; two, his return to the same unchanged social environment, which was probably the original cause of the victim's addiction; three, the patient's inferior mental stamina, which he may have acquired or inherited, but which renders him a prey for any form of stimulant. At any rate, the treated patient who has been pronounced "cured" almost invariably lacks the disposition or will to remain abstinent, and the slightest pretext or the most indirect suggestion is sufficient grounds for relapsing.

Hence it may be assumed that something more than purging, nauseating, depressing, motor-exciting drugs must be resorted to if success in the cure of narcotic-drug addiction is to be attained. To attain the desired end entirely different forces should be enlisted in the treatment,—forces employed by the psychologist, the alienist, the neurologist, and the internist.

Obviously, pharmaceutical remedies have but a single place in the treatment of drug-addicts. Using such remedies to alleviate or ameliorate the distressing symptoms of abstention, and by combining with them the measures employed by the different specialists, one would offer to the patient a more reasonable and hopeful chance for cure than is afforded him by the hasty empirical methods used in institutions that advertise their "quick cures" in a rather alluring manner.

Successfully to cure drug addiction the addict should be treated in a hospital or institution specially constructed to receive such cases. To prevent escapes at the critical period of their treatment, and to provide for temporary close confinement which proper treatment necessitates, suitable and comfortable quarters with good ventilation and plenty of sunlight should be provided. Drug addicts are notoriously unreliable and should be closely watched; their quarters should be frequently searched for smuggled drugs. The seeming sincerity they display and their manifest inordinate desire for relief from their addiction would deeply impress the inexperienced, yet few addicts have been able to maintain for any length of time the same degree of interest in themselves which they so zealously manifested on previous occasion.

If only for these reasons the addict should be treated in an institution and not at the patient's home, and for no less a period than a year. Such prolonged and enforced residence in an institution may seem arbitrary and in effect unneccessary for the rare, earnest, and sincere addict, but experience with a large number of users dictates the need of employing such peremptory measures, successful treatment being attained only by adopting them. One can see the hopelessness of attempting to treat narcotic drug addiction in private practice, especially while the patient is free to enjoy any quantity of drug he may desire regardless of his physician's instructions. The honest physician should not undertake to treat such cases under such conditions. Whether the law should be amended prohibiting the physician in general practice from treating narcomaniacs at home and limiting him to the prescribing of narcotic drugs only in extreme emergency cases is suggested by the inevitable failure of home treatment and the opportunity it has opened up for the unscrupulous physician, to carry on a nefarious trade in narcotic-drugs. It seems that if that part of the Harrison Law were repealed and the law so amended as to limit the practicing physician to the prescribing or dispensing of narcotic-drugs only to meet emergency needs in his legitimate practice of medicine, the sordid and harmful practices of the unscrupulous physician could be obviated. Such a change in the law would indeed affect the honest practitioner, but the limitation would entail no hardship upon him if he would appreciate the futility of giving home treatment to drug addicts by the reduction method without the exercise of some form of restraint, such, for example, as could be obtained in an institution.

The aged user, the paralytic, and others too far gone for treatment, must have their daily supply. Who shall prescribe for them? The question, to be properly answered, must involve the proposition limiting the manufacture and sale of narcotic-drugs to government agencies, and the right to dispense narcotic-drugs to local boards of health. By so centralizing the source of supply in local boards of health and by compelling the druggist, the physician, the dentist, and the consumer to obtain their supply from this source, the irredeemable user could be taken care of and the unscrupulous physician and druggist would be eliminated, permitting the crusade against the evil to progress without hindrance from that source. At the same time, the redeemable addict could be induced to enter an institution for treatment, even for a protracted period, if his source of supply is completely cut off.

These suggestions apply only to the social users, of which there are approximately seventy percent. The criminal and delinquent type, of which there are approximately twenty percent, are subjects for the penologist and criminologist. This class of users is the most hopeless and most dangerous element to deal with. They are intractable, cunning, designing, and wholly devoid of moral responsibility. It is their ambition to enlist new victims in the army of drug users, making it their business to keep them constantly supplied. In this class may be found the drug peddler, the white-slaver, the pickpocket, the panhandler, and the all-round crook. Therefore, the successful eradication of the evil and the uprooting of the traffic would necessarily entail a disposition of this class of narcotic-drug users. With the elimination of this class the task of caring for the social user and for those who have contracted the habit through illness would be less difficult. The latter class constitute approximately ten percent of users, and indulge in drugs only to maintain a normal mental and physical tone.

The activity of the authorities in rounding up drug users and meting out to them the penalty imposed by law may be commended when it affects only the criminal class of users. But when the crusade is made general, affecting the redeemable social user the responsibility rests with the medical profession for having failed to recognize the condition as a definite disease, and to urge the employment of medico-social measures instead of penal measures in the rehabilitation of the unfortunate victims. The condition may still be remedied if the federal government and our legislatures would provide ample and suitable facilities for the care of the addict.

The penal institution has never cured the drug and alcohol inebriate. Unfortunately many addicts have been initiated to the use of habit-forming drugs in such institutions, taking it principally for the purpose of creating a euphoria to take the place of the depression which jail walls produce. On his discharge from the penal institution, the addict finds himself without moral fibre or mental strength, the need of which is obvious, if he is to be restored to his normal self.

Unfortunately the Harrison law provides that the addict should be deprived of his supply, but does not provide for his care. In other words, the law as it stands today drives the addict to employ the very means of procurement which it aims to contravene. Much of interest could be written on the methods employed by the addict to procure drugs. Where fair means fail, foul measures are unhesitatingly adopted. He who was meek and mild prior to addiction, is transformed under the stress and strain of enforced abstinence into the desperate habitué cunningly overcoming every obstacle which may be in the way of his obtaining sufficient funds with which to purchase his supply of drugs. In spite of our anti-narcotic laws, addicts apparently experience little difficulty in securing a plentiful supply. The price may be exorbitant, often productive, the product poor of quality and usually adulterated, yet these are not barriers to procurement when the symptoms of abstention manifest themselves in the patient. Many of the breaks and entries of police record have been committed in all probability by the cocaine habitué in his effort to obtain funds with which to procure drugs.

The police authorities of Massachusetts, appreciating the importance of segregating the different classes of drug users, have shown a disposition to give the habitué a chance, and the Norfolk State Hospital is being frequently called upon by the officials, to make analyses of doubtful cases and to advise what disposition should be made of them. In other states the addict's chances are not so good. The social user, the criminal, and he who contracted the habit through illness are thrown together and handled as a single class of offenders. As a result the social user comes in intimate contact with the vicious type, contracting, so to speak, his criminal tendencies and methods. This state of affairs should be done away with.

Contrary to the prevailing opinion of the medical profession and the laity, the majority of drug-users have themselves to blame for their addiction. These facts have been gleaned from addicts, approximately seventy percent of whom admitted on close questioning that their enslavement in drugs is due to their own manner of loose living and indiscriminate social relations with users. Thus stands the medical profession as a whole exonerated from the oft-repeated charge that its members are responsible for the widespread addiction among men and women. In this respect it may be said that as a general rule an addict's confession or admission is to be regarded with suspicion, and should be relied upon only when corroborated by others in whom confidence can be reposed. But when an addict places the responsibility of his folly upon himself, accepting whatever disposition his examiner will make of him, his statement may be regarded as true.

Unfortunately the medical profession does harbor unscrupulous physicians who have undoubtedly done much to further the spread of the evil. These men are responsible for the general accusation against the profession in this as in other things. Jail sentence is the only remedy for them.

Even the honest but untaught and inexperienced physician has undoubtedly unconsciously induced the habit in patients ill with a painful malady by prolonged administration of habit-forming drugs. He should be educated.

In the interest of the seventy percent of social users of narcotic-drugs, which constitute the desirable class for institutional treatment, our legislatures should be urged to provide suitable and adequate facilities for their proper care along modern and rational lines, that they may be restored again to useful citizenship and to society. These facilities should be provided, as Dr. F. H. Carlisle suggests, on an island far away from outside interference.

Clinical Department.

ACUTE PRIMARY "IDIOPATHIC" PHLEGMONOUS GASTRITIS. REPORT OF A CASE WITH BACTERIOLOGICAL FINDINGS.*

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By this term is generally understood a purulent inflammation of the stomach wall, which most often localizes in the submucosa, and there leads to more or less extensive pus formation but which may also affect the mucosa, muscularis, submucosa and serosa.

On the basis of etiology, phlegmonous gastritis is divided into two classes.

1. The primary or idiopathic forms, in which a direct cause is not demonstrable.

2. The secondary forms. The latter are again divided into three sub-groups.

a. Direct extension phlegmons, *i.e.*, those following oesophagitis.

b. Local secondary phelegmons which follow ulcer, carcinoma, or an operation.

c. Metastatic secondary phlegmons, in which infection of the stomach follows infection of some other part of the body.

On the basis of pathologic anatomy two forms are distinguished: the diffuse phlegmonous gastritis, in which the pus infiltration spreads diffusely over a considerable area, and the circumscribed form or gastric abscess. Strictly speaking, only the former should be included among the cases of phlegmonous gastritis.

The primary or idiopathic phlegmonous gastritis (Hosch[1]) is the most frequently encountered, and our case also belongs to this class. It is not our purpose to give an extensive review of the literature, as several excellent reviews are on record, among the more recent of which is that of Bossart[2] in 1912, which consists of a comparative study of all cases which the author was able to find with a complete bibliography. Among the earlier papers may be mentioned those of Schnarrwyler,[3] Robertson,[4] Adams,[5] Koenig.[6] Jensen,[7] in 1911, recorded the detailed histories of ten Danish cases, and found 121 on record elsewhere. In the literature before 1911, Bossart was able to collect 110 cases of circumscribed and diffuse phlegmonous inflammations of the stomach wall. Emge,[8] in 1914, thought that only one-half the cases reported, or about 50, were true primary, or idiopathic phlegmonous gastritis. It is difficult to make a correct estimate without running down each case recorded, but most authors are agreed that the idiopathic variety is the one most commonly observed.

The history of this case was kindly furnished me by Dr. Paul Oliver of the Surgical Staff, of the Cook County Hospital.

The patient was a laborer, 58 years old, of Swedish nationality. He entered the hospital Dec. 24, 1915, because of a large inguinal hernia on the right side, which had slowly grown in size during a period of eight years. It had never been painful or irreducible, and he wished to have it attended to because of some discomfort and interference with heavy work. He also stated that a swelling of the left forearm had developed and persisted, following a fall upon the hand one week previously. He had noted some edema of the ankles during the past year. About a year ago the patient had been in the hospital on account of broken compensation. He further stated that at one time he had been a heavy drinker, but had not taken liquor in recent years. He had had some nocturnal frequency of urination. Otherwise the history was negative.

Upon physical examination, the man appeared to be obese, with ruddy complexion and a moderate acne rosacea. The mouth was in bad condition; teeth decayed, pyorrhoea alveolaris, tongue swollen and covered with a brown coat. The tonsils showed some enlargement. Except for a few mucous râles the lungs were negative. The heart dulness was increased. There was a systolic murmur transmitted to the axilla and an accentuated second pulmonic. The abdomen was negative, except for the liver, which was palpable two fingers' breadth below the costal margin. In the inguinal region there was a large hernia which passed down the inguinal canal and was easily reducible. A smaller hernia was present on the left side. There was a soft edema of both ankles. There was swelling and discoloration of the left forearm and hand which the Roentgen plate showed to be due to an incomplete fracture of the radius. The urine showed a specific gravity of 1.012, a trace of albumin and granular and hyaline casts. From these findings a clinical diagnosis of right complete indirect, inguinal hernia, left incomplete hernia, decompensated heart lesion, chronic nephritis and recent left Colles fracture was made.

After a period of appropriate medical treatment the patient improved, so that on Jan. 4, 1916, a repair of the right hernia under local anesthesia was made by Dr. Ryan. The post-operative course was normal in every way until the night of January 15, about ten days after the operation, when he complained of a chill and his temperature rose to 101.6 with a pulse of 96. He then complained of pains in the abdomen, especially in the epigastrium. During the next three days the temperature ranged between 99.8 and 102, with the pulse becoming more rapid and the pains more severe. During the night of January 17, the patient moaned all night because of the severe pain. He did not vomit at any time.

Dr. Oliver first saw the case on the 18th of January and found the patient with flushed face and apparently in distress, with respirations rapid and shallow, temperature 101.2, pulse 130, irregular and weak. The abdomen was rigid and somewhat tender in the epigastrium. The patient pointed to the epigastrium as the source of the trouble. There seemed to be slight shifting dulness in the flanks. A probable diagnosis of general peritonitis was made, the source of which was difficult to determine, a perforated gastric ulcer being thought most likely. Immediate operation was decided upon, and under ether anesthesia, the abdomen was opened through a right rectus incision. As soon as the peritoneal cavity was entered a few ounces of a dark sero-pus escaped. Exploration of the lower abdomen was negative, except for a hernia on the left which contained an appendix epiploicum. There was only slight injection of the peritoneum in this region, but the serosa of the bowel of the upper abdomen showed marked injection and some fibrinous exudate. The omentum was found firmly wrapped about the stomach, just as it is often found about an acute appendix. Upon its separation, a large amount of pus escaped and revealed the stomach a uniform angry red, having the appearance of a very acutely inflamed appendix. The wall was stiff, thick, indurated and edematous and the process seemed to involve the entire organ, stopping abruptly at the pyloric sphincter. The duodenum beyond could be felt thin walled, and apparently normal. The pylorus felt like a solid mass. Careful search was made for a perforation without success. Nothing further was attempted, the patient being put to bed with tubular drainage in the suprapubic stab wound and upper abdomen. The patient did not react after operation and died in about eight hours.

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The post-mortem examination was made on the afternoon of the same day, January 19, 1916, by Dr. H. Gideon Wells, to whom I am indebted for the abstract from his autopsy records and for permission to work up the case.

The following is an abstract of the autopsy notes on this case:

External Appearance. The body is that of an obese man. There is a slight yellow coloration of the skin. The superficial lymph glands are not palpable, except those of the right groin. There is some edema of the legs. The scrotum is reddened, and in the right side is an indurated mass about 5 cm. in diameter, continuous with the testicle. There is a little hernial bulging on the left side. In the anterior abdominal wall are two openings, one above the pubic crest and extending to almost the costal margin above the outer border of the right rectus. There is another drain in the lower portion of the latter.

On palpation, there is an indurated mass along the course of the right inguinal canal. Above the umbilicus is a circular nodule in the subcutaneous fat, 7 mm. in diameter. There is a recently healed surgical wound parallel to the right Poupart's ligament.

Abdominal Cavity. There is a considerable amount of subcutaneous fat, about 5 cm. in thickness. The upper drainage tube passes between the liver and stomach, deeply into and over the lesser curvature to reach the retroperitoneal tissue. The peritoneal surface is very much reddened. The lower tubular drain runs into the cul-de-sac of Douglas in which there is a small amount (30-50 c.c.) of purulent fluid. A cigarette drain runs between the intestines. The peritoneal coat is injected, but for the most part is shiny. In the interstices of the peritoneum are pockets of purulent fluid but no large accumulations of fluid, and no fibrin. The left inguinal ring is open and admits two finger tips up to the external ring, after which only one finger tip is admitted. The right inguinal ring is closed. The mass consists here of fibrofatty tissues in which are small hemorrhages. There is no evidence of infection or suppuration here. The peritoneal surface in this region is puckered, but no infection is present.

The mesenteric lymph glands are not enlarged, but there are small pigmented spots and a small calcified fibrous strand in the peritoneum. The appendix is free but atrophied. Such pigmented areas are also found 20 cm. above the ileocoecal valve. There is one particular area, one mm. in diameter, in which the peritoneum is necrotic and a necrotic tissue protrudes, but there is no perforation. There are no perforations in the small intestines. In the lesser peritoneal cavity there is a little purulent fluid but no perforations. The lesser peritoneum is free from adhesions. Some fibrous adhesions are present about the spleen; also a few about the sigmoid. The diaphragm is at the fourth interspace on the right side, and at the upper border of the sixth rib on the left.

Gastro-intestinal Tract. In the intestines there is a small pigmented area in the ileum, but no ulcers. The stomach shows a markedly hyperemic but smooth serosa, and on palpation shows diffuse thickening of the wall but no great induration. The thickening is most marked above the pylorus. On the lesser curvature is a point of irregular perforation limited to the serosa where the drainage tube was located. There are no adhesions about this perforation. Upon opening the stomach, the mucosa is seen to be diffusely hyperemic with hemorrhages beneath the mucosa. Folds of mucosa are missing. There is a purulent infiltration of all parts of the wall, and when cut, creamy yellow pus oozes out. The infiltration extends from the cardiac orifice to the pyloric valve, where it stops abruptly. The mucous membrane is everywhere intact. The purulent material forms a layer apparently in the submucosa, one to four mm. in thickness, the pus oozing out slowly from the cut surface everywhere. The stomach is heavy and boggy, weighing 440 grams, emptied. No ulceration or tumor masses are visible. The mucous membrane is swollen and edematous. There is some hemorrhage in the mesogastrium, but no adhesion about the stomach.

Other autopsy findings are indicated by the following:

Anatomical Diagnosis. Acute diffuse phlegmonous gastritis. Acute suppurative peritonitis. Two recent laparotomy wounds with drainage. Recent healed herniotomy incision. Remains of hernial sac in right inguinal canal with hematoma. Chronic interstitial nephritis (red granular kidney). Thrombotic occlusion of anterior coronary artery with anemic necrosis in left ventricle. Hypostatic congestion and edema with broncho-pneumonia in right lower lobe. Slight atrophic cirrhosis and passive congestion of the liver. Parenchymatous degeneration of the liver and spleen. Fibrous perisplenitis. Senile arteriosclerosis with atheroma. Edema of lower extremities. Obliteration of left tunica vaginalis testis. Necrotic masses in serosa of ileum. Lipomatous nodule in anterior abdominal wall. Diffuse fibrous myocarditis.

Histological Examination. The surface of the mucosa shows only post-mortem changes. Just beneath the surface there are small areas of hemorrhage. In the deeper portions of the mucosa, bordering on the muscularis, there is a diffuse infiltration of polymorphonuclear leucocytes. Scattered throughout this area are small masses of bacteria. The muscle bundles in the muscularis mucosa are widely separated and the spaces between are filled with polymorphonuclear leucocytes. In the upper layer of the submucosa there are two large circumscribed areas consisting of polymorphonuclear leucocytes and small masses of necrotic connective tissue and elastic fibers. Between these two areas of suppuration the submucosa shows only a diffuse infiltration and some fibrin. The deeper layers present the same picture. The serosa is normal. Apparently the pus infiltration of the submucosa occurred in two bands separated by a wall which had not yet been replaced by pus, and only the upper layers of the submucosa were involved in the process. The diagnosis was acute interstitial phlegmonous gastritis, with marked suppuration of the submucosa and muscular coat, but no ulceration of the mucosa.

Bacteriological Findings. Microscopical examination of pus smears taken from the wall of the stomach and stained with methylene blue showed pus cells filled with chains of diplococci, four to six pairs to the chain. Scattered through the field were single diplococci. Careful search of several smears failed to reveal any other organism. Other smears stained with Giemsa's stain showed that the pus consisted almost entirely of polymorphonuclear neutrophiles containing this same short-chain streptococcus, for the most part intracellularly.

Cultures were made on January 19, 1916, the day of the autopsy. After searing the surface of the stomach wall, pus was aspirated with a sterile Pasteur pipette. The contents were then smeared over the surfaces of agar and blood serum tubes, and also inoculated into broth. In addition, some of the material was plated on blood agar. Both aerobic and anaerobic cultures were made; the anaerobic cultures being placed in a Novy jar, and the pyrogallic acid method used to obtain anaerobic conditions.

After twenty-four hours the broth showed a uniform turbidity. On shaking, a faint cloud could be seen whirling through the medium. On slant agar there were discrete, dewdrop, moist colonies, each about 0.5 mm. in diameter. Growth was very poor. On Loeffel's blood serum, there was a pale, yellowish-brown slimy growth covering the surface. The surface of the medium had not been digested. Smears from these cultures showed the same organism that had been observed in the pus smears, and here, too, it occurred in short chains and diplococci. It retained the stain by Gram's method of staining. Subcultures made on all the ordinary laboratory media gave all the cultural characteristics of the streptococcus group. On blood agar (human blood), there appeared small pin-point colonies, with a clear zone of hemolysis about one mm. wide around them. The cultural characteristics were the same, both aerobically and anaerobically.

The fermentative reactions of this organism were studied, both aerobically and anaerobically. For this purpose three loopfuls of a twenty-four hour old broth culture were inoculated into tubes containing ten c.c. of sugar-free broth, and one per cent. of the sugar or carbohydrate to be tested. In addition, each tube contained enough of a one per cent. litmus solution to give it a distinct blue color, and a small inverted fermentation vial to show gas formation. The substances tested were dextrose, lactose, saccharose, raffinose, dulcite, arabinose, salicin, sorbite and xylose.

The aerobic culture fermented dextrose, lactose and salicin with enough acid formation to impart a distinct red color to the litmus, but without gas formation. The cultures containing dulcite and sorbit were very faintly acid, and showed no gas. Saccharose, raffinose, arabinose and xylose were unaffected.

Anaerobically the organism fermented all the substances tested with the formation of acid. In the cases of dextrose, lactose, saccharose, dulcite, sorbit and xylose enough acid was formed to completely discharge the color of the litmus. Gas was formed in all the tubes, varying in amount from a single bubble in those containing saccharose and salicin, to a tube-full in those containing dextrose, raffinose, dulcite and sorbit.

Experiments were also carried out in an attempt to reproduce this condition in animals. A rabbit was injected intravenously with a twenty-four hour broth culture and died the next day showing all the findings of an acute toxemia except an enlarged spleen. The organism was recovered in pure culture from the heart's blood. Several animals were thus treated with the same result.

Two guinea-pigs were injected intra-cardially with one c.c. each of a twenty-four hour culture and died the next day of acute toxemia. In none of the rabbits or guinea-pigs did the stomach show any lesions whatever.

An aseptic operation was performed upon a dog in which a twenty-four hour growth on agar suspended in sterile salt solution, was injected into the wall of the stomach, through a laparotomy wound. The animal recovered from the operation and the wound healed, but no symptoms of illness developed after two weeks. The same dog was then given an intravenous injection of another twenty-four hour growth, without showing any ill effects after forty-eight hours. A subsequent intra-cardiac injection of the same organism caused death within twenty-four hours. A streptococcus was isolated from the heart's blood, but the stomach was normal, with the exception of a small hemorrhagic area in the serosa, representing the site of injection.

A similar operation was performed on another dog, who also recovered, and after two weeks seemed to be perfectly normal. Because of the statements in the literature that alcohol seems to be a predisposing factor, we introduced 50 c.c. of 50 per cent. alcohol into the stomach of this dog on several successive days, by means of a stomach tube. A twenty-four hour broth culture of the same organism was then poured over the meat which was eaten by the dog at a single meal. The animal became ill, with spells of vomiting for two days, but later recovered and seemed to be as well as ever. One month after the operation this dog was given an intravenous injection of a twenty-four hour culture, and was killed the next day. A careful examination of the stomach at autopsy showed only a few punctate hemorrhages beneath the mucosa; otherwise it was normal.

In most of the cases thus far reported streptococci have been found commonly in pure culture, rarely associated with other organisms such as the staphylococcus, or the Bacillus coli communis. Muenter[9] reports a case in which the pneumococcus was apparently the causal organism.

As early as 1893 Pilliet[10] states that according to Straus and Sebillon the infiltration of the stomach wall, and especially the connective tissue of the submucosa, is caused by death or injury to the mucous membrane, through which streptococci may gain access to the depths. He further states that in producing the disease, experimentally, mineral acids or organic acids are of no avail, since they lead to the formation of a scar or only to a hemorrhagic infiltration of the wall. By introducing 5 gm. of zinc chloride (1-10), over a period of three days, into a rabbit, he succeeded in causing the formation of a scar and edematous swelling of the mucosa and submucosa, so that the thickness of infiltrate was 0.1 to 1 cm. No bacteria were demonstrable in sections. His conclusion is that acute fibrinous infiltration of the stomach wall is brought about only with the caustic solutions, such as zinc chloride and not with coagulating substances. This, according to him, is the first step in the production of phelegmonous gastritis. Our own experiments along these lines were negative, in the case of a dog. Kleineberger's patient[11] received 3.5 gms. of potassium iodide in three days, and this author believes that the iodide entered the stomach through defects in the mucosa and set up an inflammatory process which later led to phlegmonous gastritis. Bossart (loc. cit.) believes that idiopathic phlegmonous gastritis has its points of origin in the flat epithelium at the cardiac end of the oesophagus, and that this region is especially favorable for the localization of streptococci.

More recently, Cheinisse[12] has directed attention to the unappreciated occurrence of acute gastritis in infectious diseases. He has encountered several cases of erysipelas and mumps in which the gastric symptoms dominated the clinical picture and could be explained only by assuming a localization of the specific infectious process, the erysipelas or the mumps, in the stomach. Cheinisse had a case of phlegmonous gastritis in 1909 which developed in the course of an apparently mild erysipelas. Baird[13] also reports a case which ended fatally shortly after the development of facial erysipelas. Vasilevsky[14] also believes that phlegmonous gastritis is a secondary complication in the course of some general infection such as erysipelas. In his case the erysipelas spread to the mucosa of the mouth, pharynx, oesophagus and stomach.

We are inclined to believe that local injuries are not an important factor in the causation of this condition, but rather that it represents the localization of an organism, analogous to subcutaneous phlegmon, and to be explained on the basis of the anatomy of the organ, and possibly thrombosis of the vessels of the submucosa. As bearing upon the rôle of focal infections in the production of phlegmonous gastritis, the case of Schwarz[15] is of interest. In his case the infection apparently spread from the tonsils, which were swollen and ulcerated. In the latter, as well as in the fauces and in the peritoneal exudate, numerous streptococci were found. Schwarz believes that a portion of the cases, at least those with unknown sources of infection, might be explained as due to infection from the tonsils. It should also be remembered that this condition is practically never diagnosed except at autopsy. It would be well to bear in mind that this condition is a possible complication in acute infectious diseases and to suspect it whenever acute stomach symptoms develop, especially when accompanied by sudden pain in the epigastrium, and severe vomiting of material containing pus.

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Medical Progress.

PROGRESS IN OPHTHALMOLOGY.

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ÆTIOLOGY OF GLAUCOMA.

R. H. ELLIOT has written on the ætiology of glaucoma, discussing various theories. We quote him as follows. We cannot base our ætiology on the pathology, but on clinical observations tempered by a study of the changes produced both in the eye and in the organism by those conditions of life which may be causative of the disease. Glaucoma being a label for a large group of conditions, the distinctive feature of which is increased tension, must have a widely different ætiology in different cases. Once increased tension is established, every sign and symptom finds a ready explanation.

The different factors cited as causes of glaucoma may be brought under one or the other of two headings: (1) Those which influence the balance of secretion and excretion of the intraocular fluid. (2) Those which directly or indirectly determine a change in the vascular conditions prevailing within the eye. Taking up the more interesting observations, we have, changes in the vortex veins. Ligature of these veins in animals produces increase in tension, but thickening and obstruction of these veins in glaucoma is rare. Disease of the vessels, brought forward as a cause, may usually be put down as a result, of the increased tension.

Schnabel in 1892 thought that cupping of the disc was due to an acute atrophy of the nerve itself. The lamina cribrosa was not pushed back by pressure, but pulled back by shrinking of the nerve. Small spaces were formed, and at length a large cup—a cavernous atrophy. But this cavernous atrophy has been met with in eyes that never have had increased tension, and no signs of it are found in most glaucomatous globes. Disappearance of the cupping has been seen after an operation permanently reducing the tension. T. Henderson believes that a structural change in the pectinate ligament is responsible for an obstruction to the ready access of the aqueous fluid to Schlemm's canal.

Sclerosis of the pectinate ligament may offer an obstacle to free escape of aqueous, but it is universal as age comes on, while glaucoma is not very common. Intraocular pressure does not tend to rise as age advances. This theory does not account for shallowing of the anterior chamber nor closure of the filtration angle. The production of edema by action of acids or alkalies on the colloidal tissues of the body led Fischer to consider glaucoma an edema of the eyeball, in which the amount of water held by the hyrophyllic colloids is increased by an abnormal amount of acid. But we do not find the swelling of the ocular tunic which the theory demands, nor the strength of acid sufficient to produce the effect.

Closure of filtration angle is caused by the base of the iris being pressed against the periphery of the cornea. Next the surfaces adhere from plastic exudate and the iris is firmly compressed so as to occlude the spaces which normally allow the free passage of fluid through the iris stroma. Finally atrophy of the iris comes on, and a drawing back of the iris when the ciliary processes retract. In congestive glaucoma, turgescence of the ciliary processes displaces their apices forwards and inwards, and carries the iris forward, and tends to jam its base against the cornea. In simple glaucoma, forward displacement of the iris is a result of the enlargement and advance of the lens. Closure of the filtration angle occurs at some stage in nearly all, if not in all, cases of primary glaucoma. Shallowing of the anterior chamber is associated with closure of the angle, and in itself favors a wider adhesion of the iris base with the cornea. When there is increased tension without much shallowing of the anterior chamber there is an altered aqueous which renders filtration slow and difficult. Priestley Smith sums up his views as follows: A shallow anterior chamber is a physiological condition of the time of life in which primary glaucoma arises, and is due partly to growth of the lens and partly to advancement of the lens by the prominent ciliary processes.

In an acute attack the turgid processes block up the circumlental space, and the vitreous is imprisoned behind the lens and drives it forward, and perhaps the swollen processes themselves drive forward the lens. Smallness of the eye is frequent in glaucoma, and the eyeball is fully grown somewhat before the rest of the body, while the lens grows larger as life advances.

Probably these changes are operative in the causation of all attacks of glaucoma. In the congestive attacks they are overshadowed by evidences of the vascular storm. The incidence of glaucoma increases with advancing years, and may be attributed to: (1) enlargement of lens, (2) slackening of zonule, (3) thickening of pectinate ligament. Degenerative changes: (1) increase of volume of fluid secreted by the eye, (2) alteration in the nature of the secretion of ciliary body, (3) autogenetic intoxication. Risley says glaucoma rarely occurs in individuals in good general health, and LaGrange says such an eye is a sick eye in a sick body. Arteriosclerosis is probably not a factor; as far as high blood pressure is concerned, loss of vasomotor control in the body generally, and in the eye specially, plays a part in the causation of glaucoma. Females suffer from glaucoma more than males, in the proportion of about 57% to 43%. Heredity, too, plays a part. Smallness of eye, a want of normal development of structures about the angle of the anterior chamber, instability of nervous and vascular systems, conditions of environment, may all be considered here. Perhaps there is some connection between hyperopia and glaucoma, though it can occur in myopes. Mydriasis from drugs, exclusion of light, influence of violent emotions, and the effects of depressing diseases may give rise to increase of tension. Finally, febrile diseases and injuries must be included in the etiology of glaucoma.

INTRASPINAL TESTS AND MEDICATION.

Examination of the spinal fluid has attained great value in the diagnosis and the spinal route has aided in treatment. Ayer reports 160 cases of interest to the ophthalmologist. He finds this method most important, not in the plain cases of tabes or atrophy, but in early cases of slightly irregular or unequal pupils, perhaps with sluggish reaction, in early diplopia, suspected atrophy, etc. Of 40 cases of external ocular palsy, in eleven the tests were of prime importance, the palsy being the only sign. In 44 cases of primary optic atrophy there were found only 12 normal spinal fluids, and four of these tests were after antisyphilitic treatment. The outlook for the atrophies, if taken far advanced, is nearly hopeless; in early cases there is some chance. Argyll-Robertson pupils mean syphilis of the nervous system, but the spinal tests may show whether the disease is active, or stationary and degenerative only, or dead and quiescent. When irregular pupils are found, the importance of syphilis as an active factor can be determined.

Along this line is the work of Schoenberg, who has done experimental work on intracranial treatment of syphilitic optic nerve affections. His experiments show that serum introduced into the spinal canal does not reach the optic nerves. There is no doubt that spirochetes and not toxins alone, are the cause of syphilitic primary optic atrophy. The outer and the inner (ventricular) surface of brain, the outer surface of the optic nerves, the perivascular spaces penetrating into the brain tissue and into the septa between the optic nerve bundles, form a system of spaces and channels filled with cerebrospinal fluid, and into this we must introduce our medication if we intend to reach the nervous tissue itself.

Schoenberg tried intravital staining in animals, and found that intraspinal or intravenous injection of the stain did not reach the optic nerves. The chorioid plexuses retain the stain in intravenous injections. Cranial intraventricular injections, without exception, gave the best results. The accepted view is that tabetic and paretic optic atrophy consists of a primary degeneration starting in the retina, while in cerebrospinal syphilis the degeneration is descending, often following an inflammatory process in or around the chiasm or optic nerve. Syphilitic and metasyphilitic changes then occur under two types—one mainly in the vascular interstitial tissue, the other mainly in the parenchymatous tissue (ganglion cells and fibers). The first constitutes cerebrospinal syphilis, the second tabes and general paralysis. More recent studies seem to throw doubt on the retinal origin of primary optic atrophy and that everywhere an exudative process precedes such a picture, but the spirochetes must play the important part. If these researches are confirmed, the importance of direct treatment is evident and must be intracranial so as to get at the microörganisms while they are in the nerve sheaths and before they migrate into the nerve bundles and between the fibers, and degeneration has set in.

TRAUMATIC HYPOTONY.

Treacher Collins treats of that form of hypotony occurring after contusions of the eyeball, in which no perforation of its coats has taken place. The duration of the diminished tension varies from a few days to several weeks, and in some cases it appears to be permanent. The author gives several cases, and discusses the probable causes at length under these headings: (1) Diminished secretion—(*a*) from nerve inhibition, (*b*) from vascular disturbance, (*c*) from epithelial damage. (2) Increased excretion—(*a*) through normal channels, (*b*) through new formed channels.

We give his conclusions: That hypotony may be due to different causes, and more than one cause may be present in the same case. The cases of short duration are due to increased rate of excretion through expanded normal channels or possibly to some arrest of secretion from paresis of the vasoconstrictor nerves.

When of long duration, it may be due to the formation of new channels of exit from the anterior chamber, either from an internal scleral rupture or rupture of the pectinate ligament, the cutting off of the blood supply to the ciliary body from rupture of the anterior ciliary arteries, or possibly detachment of the pars ciliaris retinae. If accompanied by extensive hemorrhage into the anterior chamber, either the canal of Schlemm has been opened up by internal scleral rupture, or the anterior ciliary arteries have been torn across from cyclodialysis. If a portion of the iris has disappeared, as though an iridectomy had been done, there has been cyclodialysis with rupture of the anterior ciliary arteries. If a translucent area appears after a time just outside the sclero-corneal margin, then there has been an incomplete internal rupture. If the anterior chamber becomes markedly deepened in the whole or in part of its circumference, there has probably been a rupture of the pectinate ligament and of the ciliary muscle, prolonging the angle of the anterior chamber outward.

If the lens is dislocated laterally and the retina detached, the vitreous humor has probably come forward into the circumlental space, and may have dragged the pars ciliaris retinae away from the pigment epithelium.

ANOMALIES OF ACCOMMODATION.

Duane considers anomalies of accommodation from the clinical point of view. He has observed the following: (1) The accommodation may be persistently below normal limit. (2) Accommodation normal in amount, but sustained only with effort and soon exhausted. (3) Sluggishness in changing from one accommodative state to another (inertia of accommodation). (4) The accommodation in the two eyes is not the same. (5) The accommodation lies persistently above the usual normal limit. Insufficiency of accommodation may be intermittent or constant, and transient or persistent. This condition occurs in at least 5% of our patients. It is not common before 15 or after 45. It may be due to undue rigidity of the lens or to weakness of the ciliary muscle. In the type due to premature sclerosis of the lens the accommodation drops in the normal fashion from year to year, but in any one year is always below the normal standard. The second type is due to pathologic conditions; it varies, often in a haphazard manner, even rising to normal at times. Mixed types probably occur.

The causes of the simple premature presbyopia are unknown, but the ciliary weakness has been found due to: (1) Toxic conditions from infectious disorders. (2) Nasal obstruction. (3) Neurasthenia and anemia from overwork, impaired nutrition, etc. (4) Vascular hypertension. Insufficiency of considerable amount may be called paresis, and one that is more complete a paralysis. Paralysis of accommodation is due usually either to poisons (cycloplegics) or to syphilis. The syphilitic (tabes, general paresis) paralyses are intractable and of bad prognosis and not yielding to treatment, though they may get well spontaneously. They are often unilateral, and usually, but not always, associated with paralysis of the sphincter iridis. Non-syphilitic disease of the central nervous system has caused it, as also have traumatism, disorders of metabolism, eye strain and diphtheria.

In toxic and traumatic paralyses the lesion is usually peripheral. In syphilitic paralyses it is either peripheral, basal or nuclear. Unequal accommodation may be due either to lens or ciliary muscle. In syphilis, traumatism and poisons the sphincter iridis is affected too. Most of the other cases seem to be due to unequal rigidity of the lenses.

THE BLIND SPOT.

Gradle reviews what we know of the blind spot, beginning with Marriotte in 1668. The fibers from the retina around the optic disc lie in the periphery of the optic nerve, directly beneath the pia throughout its entire course.

In speaking of sinus disease, he says, the infection, the edema or other disturbing factor passes from the sinus periosteum through the diploic veins and lymph channels to the orbital periosteum, thence by continuity to the intracanalicular portion of the dura of the optic nerve, or possibly through the periosteal veins or dural veins, directly to the vein of Vossius.

If the dura alone is involved, a pressure is made upon the periphery of the nerve within the canal, and an enlargement of the blind spot will result. If the process extends farther and involves the central vein of Vossius, the neighboring nerve bundles will suffer. These are the papillo-macular bundles, and a central scotoma follows. In Gradle's view, when the optic nerve is involved in sinus disease the trouble is transmitted by the soft parts alone. The enlargement of the blind spot in an outward direction in malignant myopia is attributed to peri-papillary atrophy, of which the chorioidal signs can be seen, but the retinal measured only by the perimeter. Gradle does not believe that medullated nerve fibers cause an enlarged blind spot. He mentions the relation of the blind spot to the field in glaucoma, and the fusiform enlargement above and below the vertical meridian in sympathetic ophthalmia. In eclipse blindness there has been found enlargement of the blind spot. Gradle says that tobacco or alcohol amblyopia is due to a toxemia of the bundles within the optic nerve itself, and that the relative central scotoma may or may not include the blind spot. The author gives his method of measuring the blind spot. He used a white screen with dark steel balls actuated by a magnet from behind.

DESICCATION OF NEW GROWTHS.

Clark has had success in using the desiccation method on epitheliomas about the eye, sarcomas, angiomas, moles, warts, xanthelasmas, lupus, pterygium, granular conjunctivitis and corneal ulcers. Heat is employed just sufficient to desiccate the growth without carbonizing it. The heat is best generated by a high frequency electric current subject to accurate regulation. The author used a high speed static machine. Local anesthesia for the conjunctiva by a 4% cocaine solution; for the lids, infiltration with novocaine and epinephrin, is employed. A very fine needle in an insulated holder is just brushed over the tissue, but not usually thrust into it.

The depth of the desiccation depends on the time of contact and the driving power of the current. A minute growth or pigmentation, even on the cornea, may be desiccated without danger of going too deep, or part or the whole of an eyelid may be removed with precision. Cartilage and bone may be devitalized. After a growth has been converted into a dry mass, it is usually curetted or excised immediately, but sometimes it may be allowed to slough. There should be no bleeding. No sutures are necessary, and the cicatrix does not show a tendency to contract. Infection has not been observed, and the blood and lymph channels are sealed. The author compares this method with excision, radium and x-ray treatment, cautery, liquid air, etc., and after detailing many cases, gives the following conclusions:

Desiccation is good treatment for localized basal cell epitheliomas of lids and canthi, both from a curative and cosmetic standpoint. In advanced epitheliomas of these regions it may be a useful palliative treatment when operation fails.

The results in round-celled and melano-sarcoma have been good, but time enough has not elapsed to determine ultimate results. Success is assured in benign growths of the lids. Symblepharon usually does not follow desiccation.

GLASS WORKERS' CATARACT.

Robinson, who in 1903 and in 1907, wrote on cataract in glass workers, has a new report on this subject. In a majority of his patients, the opacity began in a characteristic way in the cortex of the lens at the posterior pole. It is just under the posterior capsule, often irregularly disc-shaped and by oblique illumination brass colored. As the haziness spreads it clings to the posterior capsule so as to be saucer-shaped and often presenting an irregular network. From the posterior pole the opacity gradually spreads and the ripe cataract has a pearly hue. In the later stages it is not to be distinguished from an ordinary senile cataract. The author believes this type of cataract not to be a secondary one, as operation usually gives good vision and shows no fundus disease. The original report gives a lengthy description of the exact nature and conditions of the work done by different workmen. The author could not get the opportunity to examine all the men in his district so that his figures are probably too low. In these factories about 400 men are employed, and he found 40 with cataracts. In the cases where the onset could be ascertained, two-thirds began before the fiftieth year. The average time from beginning failure of sight up to disablement was about three years. Both eyes are almost always affected. In another series of cases, where there is much incompleteness in the data, of men over fifty and disabled from various causes, of 114 men, 37 had cataract; and there is no record of those under 50. Dr. Legg found in 513 furnace workers 22 cases of cataract, and not more than two of these could have been included in the former statistics. In a large factory employing 4000 hands, one-half are exposed to glare of furnaces and one-half not. Each half contributes about equally to the cases of ordinary sickness, treated by a Sick Club, but all the cases of cataract found have come from the half who are exposed to the furnace glare. The frequency of cataract varies in proportion to: (1) the heat, (2) the degree of exposure, (3) the length of time each day and the number of years the men are exposed. The author discusses the physics of light at length and concludes that ultra violet rays do not cause the damage nor do the luminous rays, but the heat rays are to blame. Of course, protective measures, especially glasses, have been advised, but not much used as yet. Sir William Crookes has had glass made that will cut out nearly all the infra red rays (not our present "Crookes' glass"), but it is not yet practical, as it does not transmit enough luminous rays.

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Book Reviews.

Refraction of the Human Eye and Methods of Estimating the Refraction. By JAMES THORINGTON, A. M., M. D. Emeritus Professor of Diseases of the Eye in the Philadelphia Polyclinic and College for Graduates in Medicine. Philadelphia: P. Blakiston's Son and Company.

The author states that this work is an amalgamation of his previous works "Refraction and How to Refract," "Prisms" and "Retinoscopy." These have been combined and modified to produce a book for beginners in ophthalmology. The book certainly covers the ground in a comprehensive and entertaining manner. With the exception of a few tests of historical interest only, Dr. Thorington gives all the methods of detecting and correcting errors of refraction and muscular balance and all the theoretical knowledge necessary to a good understanding of these subjects.

The book is eminently practical and we recommend it to all students of refraction. There is a good chapter on the fitting of spectacles, etc. There are 344 illustrations—twenty-seven colored. The book is finely gotten up, with flexible covers.

The National Formulary. Fourth Edition, published by the American Pharmaceutical Association. 1916.

The first edition of the American National Formulary was issued in 1888. This fourth edition, representing the third revision of the original, is prepared by the committee on National Formulary of the American Pharmaceutical Association and is published by the latter's authority. It is official from September 1, 1916. After an historical introduction, a series of tables, a chapter on sterilization and various special notices, the text is divided into two parts, the first presenting the standard formulary, the second consisting of preparations dropped from the pharmacopoeia but retained in the form of an appendix. The passage of the Federal Food and Drugs Act has made the National Formulary a legal standard and placed it on a par with the Pharmacopeia. Its source is a sufficient guarantee that it is worthy to meet the responsibility thus placed upon it.

A Manual of Surgical Anatomy. By LOUIS BEESLY, F.R.C.S., Edin., and T. B. JOHNSTON, M.B., CH.B. New York: William Wood & Company. 1916.

For many years Treves' Applied Anatomy has been the standard work on this important subject in the English-speaking profession. The publication of this new Scottish work on the same subject by the demonstrators of anatomy in Edinburgh University, inevitably challenges comparison with their distinguished predecessor, but in point of fact should be more fairly judged on its own merits. It is not intended that the work should encroach on the domain of operative surgery, so that details of technic are largely eliminated. The book is compact and has been brought within the reasonable compass of 537 octavo pages by the omission almost entirely of descriptions of amputations of the limbs. With reference to tubercular disease of the bones and joints, especial attention is given to the anatomical relations of the diaphysis and the adjacent epiphysis to the capsules and synovial reflections of the corresponding joints. The book is conveniently divided into five sections dealing respectively with the two extremities, the head and neck, the abdomen and pelvis, and the thorax and vertebral column. It is well illustrated with 164 figures, many of which are colored and a few are radio-graphic. The authors are to be commended for the general adoption of the B. N. A. terminology. That they have not done so consistently is a creditable evidence of British conservatism and common sense. This new work is to be welcomed as a genuine contribution to the field of surgical anatomy in which it should fill a valuable place beside its English predecessor.

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THE NEED FOR PSYCHIATRISTS IN THE ARMY AND NAVY.

IN all the talk of preparedness it should not be forgotten that the medical branch of our military organization should be so equipped as to be able to meet any demands upon it, especially those demands arising out of the peculiarly stressful conditions incident to actual warfare. Of course we are accustomed to think of the army or navy doctor as first of all a surgeon. He must be capable of handling the cases as they come from the front,—the gunshot wounds, the bayonet stabs, the burns and the broken bones. Stationed at a lonely post in time of peace, far away from any civilian physician, he must be prepared for any emergency,—to reduce a dislocated shoulder, to operate upon a strangulated hernia or a gangrenous appendix.

To their credit be it said that the personnel of the medical branch of our service is composed of men who are amply equipped, not only as surgeons, but as internists. When we consider that every one of them has had, besides his four-year medical course, a year, at least, in a general hospital and a year of post-graduate work in the Army or Navy Medical College, their high average of efficiency is explained. And yet there is one branch of medicine which it would seem should be recognized as too complex and too important to be left entirely to men who necessarily must be able to give only a small part of their studies to it. We refer to mental disease. It is hardly possible for the Army or Navy surgeon, speaking generally, to acquire a sufficient knowledge of psychiatry to do justice to such cases of mental disorder as develop naturally and sporadically under service conditions or burst into being endemically under the nervous strain of battles. The frequency of mental disease among soldiers and sailors, as well as the necessity for its adequate study, is becoming appreciated and has been written on by Bouchard, Granjux, Hanry, and Rayneau in France; Borovikoff in Russia; Schultze and Heuse in Germany; and White, Richards, Smith, King, Woodson and Sheehan in the United States. It has been only comparatively recently, however, that the necessity for establishing a field hospital for the care of such cases has been understood. The first hospital of this kind was organized in Harbin during the Russo-Japanese War.[1]

The desirability of having their medical officers better equipped for the handling of such cases is, at present, recognized by both branches of the service; and at the Government Hospital for the Insane every winter the Superintendent. Dr. White, gives a series of lectures to the members of the Army and Navy Medical Colleges. Also it has been the custom for some years past to detail one man from each service at the Government Hospital for the Insane, to study mental disorder for two years at a time. An officer recently detailed there, Capt. Edgar King, has published an interesting account of his studies of mental disease in soldiers.[2] In this, among other things, he calls attention to the fact that one-fifth of all soldiers discharged are discharged on account of mental disability.

But striking as is the prevalence of mental disease among our soldiers and sailors in times of peace, we must remember that this would be greatly increased during war. Such, at least, has been the experience of the nations now in conflict, as evidenced by the many reports of mental and nervous affections which reach the medical press. Injuries of the central nervous system, due to the wind of explosives, hysterical aboulias developing in the heat of battle, hypomaniacal outbursts in protracted battles, nerve injuries by missiles, malingering of mental symptoms to escape active service, hypochondriasis and neurasthenia in recruits,—all these and many more will call for the intervention of the trained neurologist and psychiatrist. As White says, "A man may be quite able to get along all right,—in fact, to perform his duties with marked efficiency in time of peace,—who would break completely under the stress of war. This has long been realized as true of the physical, but we must begin now to realize it as equally true of the mental, especially as the game of war comes more and more to be played with brains."

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[1] Military Surgeon, 1910, Vol. xxvi, pp. 177-194.

[2] Mental Disease and Defect in United States Troops. By Capt. Edgar King, U.S.A., M.C. Bulletin No. 5, War Department.

MODERN CONTROL OF DRUG ADDICTION.

A RECENT sensational raid in Boston, whatever its justice and merits, has served to direct public attention anew to the prevalent evils of drug addiction and to modern methods and efforts for its control. The operation of the federal and state anti-narcotic laws has enabled a more active campaign against this evil and has gone far towards minimizing it. Unfortunately, however, although these laws largely control the supply of narcotic drugs, they do not provide for the care of drug habitués who are liable to become a miserable and dangerous class of derelicts in the community and who deserve control, treatment and restoration of health as much as any other group of unfortunate patients.

In view of the admitted incompleteness of action of existing drug legislation, there was appointed in Massachusetts, in July, 1916, a special commission to investigate the use of habit-forming narcotic drugs and to suggest measures for dealing further with the situation. The first public hearing of this commission was held on October 9 and the second on October 30. The members of the commission are Dr. Frank G. Wheatley, Dean of Tufts Medical School, Mr. Herman C. Lythgoe, Director of the Division of Food and Drugs of the Massachusetts State Department of Health, and Mr. Abraham C. Webber, Assistant District Attorney of Suffolk County. A similar commission is working on the same problem in New York.

At the first hearing of the Massachusetts commission, the chief questions discussed were the advisability of giving the Board of Registration in Medicine the power to discipline or disestablish members of the medical profession upon the production of evidence of unprofessional conduct, evasion or violation of the provisions of the anti-narcotic laws; and the enactment of legislation taking away from druggists the right to fill prescriptions for narcotics and placing it in the hands of a state department. The latter measure was particularly advocated by Dr. Irwin H. Neff of the Norfolk State Hospital.

At the second hearing the chief topic of discussion was the advisability of establishing separate institutions throughout the state for narcotic drug habitués. It is estimated that there are 110,000 such habitués in Massachusetts and 2,000,000 in the United States.

The subject of the control of drug addiction was also considered at the annual meeting of the American Medical Editors' Association, in New York, on October 26. At this meeting Dr. Frank S. Abbott of California emphasized the importance of isolation of narcotic drug patients, and recommended the standardization of national and state laws regarding habit-forming drugs.

In another column of this issue of the JOURNAL we are glad to publish an article by Dr. Rubin of the Norfolk State Hospital, dealing with various aspects of the situation as outlined above, and especially with modern methods for the control of drug addiction. This article derives a particular pertinence from the contemporary work of the Commission on Narcotic Drugs, and at this time should arouse the especial interest of the profession, whose attention is directed to it for this purpose.

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DECLINE IN NUMBER OF BRITISH MEDICAL STUDENTS.—It is stated in a recent issue of the *British Medical Journal* that in 1913 the total number of medical students entering Cambridge University was 116; in 1914, 64; in 1915, 41, and in 1916, 25.

TUBERCULOSIS INVESTIGATION AT FRAMINGHAM.

In a recent issue of the Journal we noted the plan of the National Association for the Study and Prevention of Tuberculosis to conduct a three-years' experimental investigation of the disease in some selected locality. On November 10, it was announced that the town of Framingham, Mass., had been selected for this purpose, for which a fund of $100,000 is available. Dr. Donald B. Armstrong, assistant secretary of the Association, was executive chairman of the committee which made this selection after a careful canvass of many towns in Massachusetts and New York with a population of approximately 10,000. The reason for the selection of Framingham instead of its closest rival, Johnstown, N. Y., was on account of the medical supervision of public schools, the district nursing association and the excellent hospitals maintained in the former town. The committee in immediate charge of the work to be undertaken is composed as follows: Dr. Edward R. Baldwin of Saranac Lake, N. Y., president of the National Association for the Study and Prevention of Tuberculosis, and chairman of the special committee of investigation; Dr. Charles Hatfield of Philadelphia, secretary; Dr. Lee K. Frankel, sixth vice-president of the Metropolitan Life Insurance Company; Dr. Stephen J. Maher of New Haven, president of the Connecticut Anti-Tuberculosis Association; Dr. Homer Folks of New York City, secretary of the New York State Charities Aid Association; Dr. William Charles White of Pittsburgh; and Dr. Arthur K. Stone, president of the Massachusetts Anti-Tuberculosis Association, and chairman of the state trustees of hospitals for consumptives.

The work will be an experiment in community coöperation, and, if successful, will form a basis for similar anti-tuberculosis work throughout the United States with a view to the ultimate total eradication of the disease. The work will be remedial, preventive and educational.

"It is planned to give a three-months' course of lectures and clinics to the doctors of the town and to have adopted a standard diagnosis.

"Every open case of tuberculosis here will be located and cared for either in the homes or hospitals and every effort will be made to keep others from being exposed to the disease. If a person can afford to pay for treatment he will be expected to pay, but if unable, all expenses will be paid from the fund.

"There will also be a campaign of education through the schools, churches and newspapers. In every way possible the people of Framingham will be roused to the importance of looking after their health. It will be recommended that every person in town be examined by a doctor at least once a year.

"If the experiment proves successful and the commission will have expended all the available funds, another $100,000 will be given toward the work by a Boston philanthropist."

Dr. Allan J. McLaughlin, Massachusetts Commissioner of Health, in discussing the project, is reported as follows:

"Obviously, the demonstration is of tremendous importance to Framingham, to the State of Massachusetts and to the world at large. If a success, it will point out the way to the control and, possibly, the eradication of this great world scourge.

"It is not only a fight against tuberculosis, but also a constructive general health and disease preventive program that is contemplated. It ought to make Framingham the healthiest and safest spot on the face of the earth in which to live.

"The success of the work depends entirely upon the complete coöperation of the local and state authorities. The Framingham people have assured the national committee of their earnest and continued support Needless to say, the State Department of Health will give every possible assistance to the work, and earnestly hopes it may be a genuinely successful fight against unnecessary and wasteful disease."

This experimental investigation is obviously one of extreme interest and its prosecution in a Massachusetts town will afford particularly favorable opportunity for observation of its progress by physicians throughout the state as well as for direct coöperation by local members of the profession.

* * *

ACUTE PSYCHOSES OF WAR.

It may be accepted without necessity for verification that the intense emotional strain associated with warfare causes acute exacerbations of some of the milder psychotic and border-land cases which were able to get along unnoticed under the less stringent requirements of civil life. Thus, cases of arrested dementia precox, the neuroses and psychoneuroses, cyclothymia and high-grade imbecility may all be found among recruits who have been mustered in without any suspicion that such conditions existed.

Dr. Arturo Morselli, consulting neurologist to the First Army of Italy, in a lecture to the Royal Medical Academy of Genoa, classified the mental cases which he believed originated directly from the emotional excitement of battle into seven kinds, all of which he thinks have a basis of "asthenia." The term is, of course, extremely general in its English connotations. These varieties of mental disorder he gives as acute asthenia, hysteria, depression, stupor, hallucinations, confusional states and maniacal excitement. Probably, according to the American method of classifying mental disease, we should call the first two of these conditions psychoneuroses. The depression and the excitement we should expect to find in individuals of a manic-depressive make-up, that is, the extroverted type, while the introverted type would show the stupors and the confusional states. Morselli speaks of transient hallucinations, which, of course, may arise in persons with feeble psychic resistances, that is, imbeciles, psychopaths and constitutional inferiors, from stimuli inadequate to others normally constituted—small amounts of alcohol, slight infections, mild fevers, abstention from food for short periods, and unusual emotional stress.

The modern idea of such deviations from the normal is that they are the expression of an underlying biological defect. To the experienced observer, such cases would not, as a rule, give rise to any great difficulty in diagnosis when they presented themselves for enlistment. The life history, as given by the applicant himself, is very suggestive to the alienist, his record with the Binet-Simon, Yerkes-Bridges, Healy, Fernald and other tests, his neurological examination, all supplemented by several days' observation of him, might result in the elimination of much rotten timber which later on becomes a problem to the army in the field.

The solution which suggests itself is to have a trained psychiatrist available for consultation at every recruiting station, especially in times of war.

Prevalence of Diseases in the United States.—The weekly report of the United States Public Health Service for November 10, 1916, states that during the month of September there were, in the state of Washington, 87 cases of typhoid fever, 24 of smallpox and 10 of poliomyelitis.

PROGRESS OF POLIOMYELITIS.

During the past week the various epidemics of poliomyelitis throughout the United States have rapidly declined. The weekly report of the United States Public Health Service for November 17, 1916, gives the following totals of cases from July 1 to November 9 as follows: New Jersey, 3,983; Pennsylvania, 1,790; Massachusetts, 1,771; Connecticut, 881; Minnesota, 849; Illinois, 805; Michigan, 449; Maryland, 309; Iowa, 212; Rhode Island, 206; Indiana, 177; Maine, 114; South Carolina, 113.

During the first 26 days of November the number of cases reported in Massachusetts was 171, making a total of 1885 in this state since January 1, 1916. Of these, 480 cases, with 124 deaths, have been in Boston. The monthly bulletin of the Massachusetts State Department of Health for Octoberr contained the following statement relative to the disease in this commonwealth during September:

> "Cases of anterior poliomyelitis continued to be reported from all parts of the state. The number for the month was 626, making a total of 1,016 cases reported to the Department since the first of January.
>
> "The peculiar distribution of cases noted last month still continues. In the Pittsfield-North Adams area the disease has come to a standstill in Adams and North Adams, while in Pittsfield there has been a gradual increase in cases, with a further centre of infection developing in the neighboring town of Dalton. In the Greenfield-Montague area but two new cases were reported. No cases were reported from Dudley and Webster, while Worcester reported but seven cases.
>
> "At present there are two important areas of infection, one is in the Connecticut valley with Holyoke and Springfield as a centre. In Westfield and Northampton the disease has remained quiescent. The other important area of infection is located in the metropolitan district, which last month had a low incidence of the disease. During July and August Boston reported but eight cases, while in September the number increased to 172, and many of the surrounding communities also began to report cases.
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> "The infection along the Merrimac River, mentioned in last month's summary, has continued active, and has extended to North Andover, Boxford, Georgetown, Newbury and Salisbury.
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> "The September reports were as follows: Boston, 172; Holyoke, 59; Springfield, 39; Pittsfield, 32; Malden, 18; Cambridge, 14; Newburyport, 13; Quincy, 12; Somerville and Everett, 10 each; Amesbury, Lynn, Medford, 9 each; Beverly, Chicopee, North Adams, Revere, 8 each; Worcester, 7; Adams, Auburn, Braintree,

Chelsea, Dalton, Dedham, Haverhill, Lowell, Newton, South Hadley and Warren, 5 each; 4 cases each in Brookline, Milton and West Springfield; 3 cases each in Belmont, East Bridgewater, Fall River, Leominster, Milford, Weymouth and Winchester; 2 cases each in Billerica, Blackstone, Boxford, Brockton, Danvers, Fitchburg, Hamilton, Ludlow, Melrose, Monson, Newbury, North Attleborough, Saugus, Tisbury, Waltham, West Newbury, Winthrop and Woburn; 1 case each in Agawam, Barnstable, Bernardston, Bourne, Bridgewater, Conway, Dover, Foxborough, Framingham, Gloucester, Great Barrington, Greenfield, Hadley, Hudson, Hull, Leicester, Lexington, Lunenburg, Mount Washington, Mansfield, Marblehead, Marlborough, Methuen, Middleton, Nahant, Nantucket, North Andover, North Reading, Northampton, Norwood, Otis, Oxford, Palmer, Plainville, Princeton, Rockland, Rockport, Salem, Southbridge, Southwick, Stockbridge, Stoneham, Stoughton, Swampscott, Taunton, Tewksbury, Wakefield, Watertown, Wellesley, Westfield, Westford, Westminster, Weston and Williamsburg.

"*Characteristics.*—Up to the present time the cases of anterior poliomyelitis have continued to affect the usual age group. The majority of the cases are under ten years of age. This characteristic is one of the most constant features of the disease. Any theory that will explain this infection must satisfactorily explain the constancy with which this age group of the population is attacked.

Mortality.—From the incomplete records received by this Department, the anterior poliomyelitis fatality rate for September was higher than for August. There were 626 cases reported, with 136 deaths; giving a rate of 21.6, as compared with the fatality rate of 15.2 for August. A more detailed analysis of these rates will be made when the final and complete figures are received from the Secretary of State's office."

The Boston clinic for the after-care of recovered cases of poliomyelitis, which was announced in last week's issue of the JOURNAL, was opened on November 21 at the Children's Hospital, under the charge of Dr. William Hall Coon, executive officer of the Harvard Infantile Paralysis Commission, under whose auspices and that of the State Department of Health the clinic will be conducted. It will be held from 9 to 11 A.M. on Tuesdays, Thursdays and Saturdays. Further plans will be later announced. The surgeons engaged in the work of the clinic at the Children's Hospital are Dr. Frank R. Ober, Dr. Arthur T. Legg, and Dr. Hale Powers. The first session of the Boston clinic was attended by 25, and the second by 15 patients.

MEDICAL NOTES.

CHANGES IN COST OF DRUGS.—Report from New York on November 15 notes further recent changes in the cost of drugs, the chief variations being an increase in the cost of quinine and a decrease in that of the salicylates.

"Heavier buying of quinine, from both domestic and foreign sources, has resulted in an announcement by manufacturers of an advance of five cents an ounce to a bulk basis of 55 cents for the sulphate in 100-ounce tins. Buying for next spring's requirements has absorbed quite a quantity of the spot goods, and an advance in cinchona bark has also had some influence on the price. A revision was announced in cinchonidin alkaloid crystals to 59 cents in 100-ounce lots; cinchonidin sulphate to 35 cents an ounce; quinidin alkaloid to 93 cents an ounce; cinchonin alkaloid to 23 cents an ounce; and cinchonin sulphate to 15 cents an ounce. All minor salts of quinine are irregularly higher. Opium, morphine,and codeine have remained firm at the recent advance, $1.50 to $1.00, respectively, while menthol has become somewhat firmer on better demand. The salicylates and other phenol derivatives have been reduced sharply by first hands, and resale lots can again be had for less than the maker's price. Camphor is quieter and prices remain steady. The demand for opium from domestic consumers is unimportant, but export takings have been somewhat heavier. The gum is quoted at $12 per pound in cases and jobbing lots, while the powdered and granular are maintained at $13 per pound."

SALE OF SPURIOUS NEOSALVARSAN.—Report from New York on November 15 states that the Federal Grand Jury at Newark, N. J., has recently indicted two citizens of Toronto, Canada, for being concerned in an attempt to defraud the Government by smuggling salvarsan and neosalvarsan into this country. In the possession of these men was found, also, a quantity of spurious neosalvarsan which, upon analysis, proved to consist of starch and sodium chloride. It appears that during the summer of 1916 an extensive sale of this spurious product was made throughout the middle Western states and as far east as New York. The alleged neosalvarsan is put up in packages imitating the English and German brands.

NEW YORK DEATH RATES.—According to figures given out by Acting Health Commissioner John S. Billings, the death rate for the past week was .35 lower than the corresponding week of last year. This decrease in the death rate is equivalent to a saving of 38 lives.

The mortality of the following diseases was lower last week than during the week ending

November 13, 1915. The contagious diseases, the diarrheal diseases, cancer, tuberculosis (all forms) and diseases of the nervous system.

There were only seven deaths from poliomyelitis in the entire city during the past week. There was a material increase in the mortality of heart disease, lobar pneumonia and Bright's disease.

The total number of deaths reported during the week was 1315, equivalent to a rate of 12.28 as compared with 1324 deaths and a rate of 12.63 for the corresponding week of 1915. In the group under one year of age there was no saving of life. On the contrary, one more death was reported among infants last week than during the week ending November 13, 1915. In the group between one and five years, 24 fewer deaths were reported. The reduction of mortality in this group was due to the fewer deaths from contagious diseases, diarrheal diseases and broncho-pneumonia. In the group over 65 years of age there was a slight increase of mortality.

The death rate for the first 46 weeks of 1916 was 13.96 as compared with 13.91 for the corresponding period of last year. This is equivalent to a drop of .01 in the difference between the accumulative rate since last week. According to Dr. Billings, this is really a remarkable showing in view of the 2000 deaths from poliomyelitis this summer and the 2000 deaths during the grip epidemic last January.

AMERICAN ACADEMY OF DENTAL SCIENCE.—A monthly meeting of the American Academy of Dental Science was held recently in Boston. Papers and discussions were presented by Dr. Charles R. C. Boardman, Dr. Charles F. Painter, and Dr. Kurt J. Thoma.

MASSACHUSETTS STATE NURSES' ASSOCIATION.—The autumn meeting of the Massachusetts State Nurses' Association was held in Boston on November 11. In the forenoon separate meetings were held by the League of Nursing Education and the Private Duty Nurses' League. At the general meeting in the afternoon the following papers were presented:

Education and Training for Public Health Nurse. Miss Anne H. Strong, A.B. and R.N., Assistant Professor Public Health Nursing, Simmons College, Boston.

Plan of the A. N. A. for reorganization. Miss Esther Dart, R.N.

Necessity for change in the Registration Law for Nurses. Miss Mary M. Riddle, R.N., Chairman State Board of Registration for Nurses in Massachusetts.

Presentation of "New Bill," endorsed by the Legislative Committee of the Massachusetts State Nurses' Association, the Council of the Massachusetts State Nurses' Association, and the "Joint Board of Registration in Medicine and Nursing."

EUROPEAN WAR NOTES.

COMMENDATION OF GERMAN MEDICAL STAFF.—In the issue of the *Münchener Medizinische Wochenschrift* for October 3 is quoted the following army order issued by the German crown prince on August 18, commending the sanitary staff of his army for fidelity in its discharge of duty. "The severe fighting before Verdun has placed upon sanitary service a task which could be efficiently discharged only if every individual performed his duty with the truest fidelity and unwearying devotion. I therefore express my warmest gratitude to all who, during the six months' fighting, have been called upon to care for the wounded and sick, to nurse them and to mitigate their suffering. Especial recognition is due to the surgeons, assistants and litter-bearers of the troops, and the entire personnel of the sanitary companies, who, gallantly and undismayed by the severest fire, stood faithfully beside their fighting comrades and manifested devotion to service in the most self-sacrificing manner. The consciousness of having been the saviours and helpers of their brave comrades in the hour of peril is for them and their faithful work the finest reward."

WAR RELIEF FUNDS.—On Nov. 25 the totals of the principal New England relief funds for the European War reached the following amounts:

Belgian Fund	$178.320.91.
French Wounded Fund	155,213.93
Armenian Fund	127,143.85
German Fund	74,972.87
French Orphanage Fund	70,898.00
British Imperial Fund	68,720.36
Surgical Dressings Fund	57,994.06
Polish Fund	49,095.33
Permanent Blind Fund	28,173.86
Italian Fund	27,268.54
French Phthisis Fund	7,309.50

BOSTON AND NEW ENGLAND

WEEK'S DEATH RATE IN BOSTON.—During the week ending Saturday noon, November 25, the number of deaths reported was 263, with a rate of 18.04 against 14.63 last year. There were 37 deaths under one year of age, against 30 last year, and 82 deaths over 60 years of age, against 68 last year.

The number of cases of principal reportable diseases were: diphtheria, 34; scarlet fever, 25; measles, 8; whooping cough, 11; typhoid fever, 5; tuberculosis, 61.

Included in the above were the following cases of non-residents: diphtheria, 10; scarlet fever, 9; tuberculosis, 13.

Total deaths from these diseases were: diphtheria, 5; measles, 1; whooping cough, 2; tuberculosis, 21.

Included in the above were the following deaths of non-residents: diphtheria, 2; tuberculosis, 4; whooping cough, 1.

Hospital Bequests.—The will of the late Elizabeth Claffey of Boston, who died on October 7, contains a bequest of $100 to St. Elizabeth's Hospital.

The will of the late Sarah C. Winn of Cambridge, Mass., who died on October 3, contains a bequest of $1000 to the Nantucket Cottage Hospital.

The will of the late Mrs. William Binney, formerly of Providence, R. I., contains a bequest of $3000 to the Sharon Sanatorium.

Harvard Surgical Unit.—On November 20 a new contingent of the Harvard Surgical Unit sailed from New York for England on the Cunard steamship *Andania.* This contingent consists of twenty nurses and the following six physicians: Dr. Francis W. Palfrey, Boston; Dr. Paul Hector Provandie, Melrose, Dr. Forrest Fay Pike, Melrose; Dr. Kendall Emerson, Worcester; Dr. Henry B. Potter, Wakefield, R. I., and Dr. Chauncey N. Lewis, Boston. It will relieve the members of the unit now on service at Hospital No. 22 of the British Expeditionary Force in France whose term expires on December 9.

Board of Health of Pawtucket, R. I.—The recently issued annual report of the City of Pawtucket, R.I., records the prevalence of reportable diseases for the year 1915 as follows: diphtheria, 125 cases with 9 deaths; scarlet fever, 61 cases with 2 deaths; typhoid fever, 10 cases with 8 deaths. A case of leprosy, confined at the detention hospital, died in March, 1915.

Miscellany.

MASSACHUSETTS STATE DEPARTMENT OF HEALTH.

Résumé of Communicable Diseases for October, 1916.

Prevalence.—In spite of the excessive number of cases of infantile paralysis reported during the current month, the total number of cases of communicable diseases reported to the Department is considerably lower than the total for the corresponding month last year, and only slightly higher than the total for the previous month of this year. All of the diseases, with the exception of anterior poliomyelitis, smallpox and mumps, show a marked decrease over last year's figures for October, especially diphtheria, typhoid, and whooping cough.

Smallpox.—Cases of smallpox appeared in Lee and Great Barrington during the month of October. Its origin was apparently a missed case which occurred back in August, imported from another State. During the months of August, September, and October, nine cases in all have occurred. An interesting fact is that in only one of these instances is there a history of vaccination having been performed, and in this case it did not take and was not repeated.

Anterior Poliomyelitis.—Basing an estimate on the incomplete records received, the fatality rate for anterior poliomyelitis for October bids fair to be a little lower than that for September. The fatality rate for September was 24.7.

It will be noted that there is an increase of 80 cases of infantile paralysis in October over the number credited to September, making a total of 703 cases for October. This increase has been largely in the Metropolitan area. Boston heads the list with an increase of about 57; Quincy with one of 33; and Cambridge with one of 22. The disease still persists in the western part of the State, but a diminution in intensity in that section is apparently perceptible.

Following is a list of towns in which infantile paralysis has appeared for the first time during the month of October: Andover, Amherst, Athol, Attleboro, Belchertown, Cheshire, Deerfield, Dennis, Easton, Egremont, Grafton, Halifax, Hatfield, Holbrook, Hopkinton, Longmeadow, Ipswich, Manchester, Mashpee, Natick, Northboro, Northbridge, Swansea, Templeton, Walpole, Wenham, Westwood, Warwick, Whitely, Wilbraham, Wilmington.

Distribution.—*All Communicable Diseases:* Total cases Sept., 1916, 3130; Oct., 1916, 3260; Oct., 1915, 4550.

Case rate per 100,000 population: Sept., 1916, 83.0; Oct., 1916, 86.0; Oct., 1915, 120.6.

Common Diseases.—*Diphtheria:* Total cases Sept., 1916, 470; Oct., 1916, 620; Oct., 1915, 1223.

Case rate per 100,000 population: Sept., 1916, 12.4; Oct., 1916, 16.4; Oct., 1915, 32.4.

Measles.—Total cases: Sept., 1916, 175; Oct., 1916, 250; Oct., 1915, 361.

Case rate per 100,000 population: Sept., 1916, 4.6; Oct., 1916, 6.6; Oct., 1915, 9.6.

Cities and towns which have exceeded their endemic index:*

North Attleboro	(1)	13
Malden	(15)	22
Belmont	(0)	6
Webster	(2)	9
Ludlow	(0)	10
Westfield	(2)	14†
Reading	(0)	16
Lowell	(7)	32
Framingham	(3)	19
Gardner	(1)	12
Leominster	(0)	60
Northampton	(0)	20

Scarlet Fever.—Total cases: Sept., 1916, 203; Oct., 1916, 309; Oct., 1915, 480.

Case rate per 100,000 population: Sept., 1916, 5.4; Oct., 1916, 8.3; Oct., 1915, 12.7.

Typhoid Fever.—Total cases: Sept., 1916, 373; Oct., 1916, 180; Oct., 1915, 440.

Case rate per 100,000 population: Sept., 1916, 9.9; Oct., 1916, 4.8; Oct., 1915, 11.7.

Whooping Cough.—Total cases: Sept., 1916, 271; Oct., 1916, 172; Oct., 1915, 649.

Case rate per 100,000 population: Sept., 1916, 7.2; Oct., 1916, 4.6; Oct., 1915, 17.2.

Cities and towns which have exceeded their endemic index:

Norwood	(1)	7
Woburn	(2)	7
Worcester	(15)	31
Springfield	(50)	67
Westfield	(1)	17
Montague	(0)	8
Fall River	(16)	29
Lynn	(8)	15
Quincy	(1)	7
Clinton	(1)	32

Tuberculosis.—The number of cases of tuberculosis, all forms, reported for October, 1916, shows a falling off over those of the previous month, and a still greater decrease over the figures of a year ago. Part of this, at least, may be ascribed to a better system of "weeding out" cases reported more than once to this Department.

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* Endemic index signifies the average for five years of reported cases exclusive of epidemics. This index is applied to each city and town for each month for certain communicable diseases. The numbers in parentheses after the names of each city and town indicate the endemic index for that city or town; the numbers without parentheses indicate the cases reported during the current month.

† Nine cases reported as "healthy carriers."

Tuberculosis, pulmonary.—Total cases: Sept., 1916, 602; Oct., 1916, 539; Oct., 1915, 732.

Case rate per 100,000 population: Sept., 1916, 15.9; Oct., 1916, 14.3; Oct., 1915, 19.4.

Tuberculosis, other forms.—Total cases: Sept., 1916, 58; Oct., 1916, 51; Oct., 1915, 85.

Case rate per 100,000 population: Sept., 1916, 1.5; Oct., 1916, 1.4; Oct., 1915, 2.3.

Rare Diseases.—Anthrax was reported from Woburn (1), and Dartmouth (1).

Cerebrospinal meningitis was reported from Chicopee (1), Clinton (1), Lawrence (1), Lowell (1), Mattapoisett (1), Worcester (1) and Boston (5).

Dysentery was reported from Newton (2), Worcester (1), and Boston (16).

Dog-bite (requiring antirabic treatment) was reported from Great Barrington (1).

Pellagra was reported from Leominster (1), Monson (1), and Boston (1).

Septic sore throat was reported from Fall River (1), Amherst (1), Freetown (1), Lynn (1), Georgetown (1), Haverhill (1), and Boston (1).

Tetanus was reported from Lowell (1), Dartmouth (1), Lawrence (1), and Salem (1).

Malaria was reported from Fall River (5), and Wellesley (1).

Trachoma was reported from Leominster (2), Bridgewater (1), and Boston (2).

OCCUPATIONAL DISEASES.

DISEASE	OCCUPATION	SEX	AGE	COLOR
Lead poisoning	Painter	M.	24	W.
Lead poisoning	Car painter	M.	35	W.
Lead poisoning	Ship worker	M.	22	W.
Lead poisoning	Melter	M.	48	W.
Nitrous fumes	Dye mfg.	M.	41	W.
Lead poisoning	House painter	M.	25	W.
Lead poisoning	Painter	M.	44	W.
Lead poisoning	Rubber mixer	M.	37	W.
Lead poisoning	Ship building	M.	53	W.
Anthrax	Flesher	M.	23	W.
Lead poisoning	House painter	M.	25	W.
Lead poisoning	House painter	M.	35	W.
Lead poisoning	House painter	M.	32	W.

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UNITED STATES CIVIL SERVICE EXAMINATIONS.

DENTAL INTERNE (MALE).

THE United States Civil Service Commission announces an open competitive examination for dental interne, for men only, on December 13, 1916. From the register of eligibles resulting from this examination, certification will be made to fill a vacancy in this position at $600 a year, with maintenance, in Saint Elizabeth's Hospital, Washington, D. C., and vacancies as they may occur in positions requiring similar qualifications, unless it is found to be in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

The department states that it reserves the right to terminate the appointment at the expiration of one year of service if it is deemed advisable to do so.

In addition to many interesting cases presented, the dental interne is given an excellent opportunity for study and for doing experimental and research work in the pathological, histological, and other laboratories of the institution.

Applicants are required to be graduates or senior students of regularly incorporated dental colleges, and applications will not be accepted from persons who have graduated for more than two years. The names of senior students will not be certified for appointment until they have furnished proof of actual graduation.

Statements as to training and experience are accepted subject to verification.

Applicants must be unmarried.

Age, 20 years or over on the date of the examination.

No sample questions of this examination will be furnished.

This examination is open to all men who are citizens of the United States and who meet the requirements.

Persons who meet the requirements and desire this examination should at once apply for Form 1312, stating the title of the examination desired, to the United States Civil Service Commission, Washington, D. C. Applications should be properly executed, excluding the medical and county officer's certificates, and filed with the Commission at Washington in time to arrange for the examination at the place selected by the applicant. The exact title of the examination, as given at the head of this announcement, should be stated in the application form.

PHYSICIAN (MALE).

The United States Civil Service Commission announces an open competitive examination for physician, for men only, on December 13, 1916. From the register of eligibles resulting from this examination, certification will be made to fill vacancies in this position in the Indian and Panama Canal Services, and vacancies as they may occur in positions requiring similar qualifications, unless it is found to be in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

The entrance salaries in the Indian Service range from $1000 to $1200 a year, and in the Panama Canal Service are $1800 a year.

As the supply of eligibles resulting from recent examinations has not been equal to the demand, qualified persons are urged to enter this examination.

Applicants must be graduates of or senior students in recognized medical schools. The names of such senior students will not, however, be entered on the eligible register in the event they pass the examination, until they have furnished proof of actual graduation.

Statements as to training and experience are accepted subject to verification.

Applicants must have reached their twenty-first, but not their fortieth, birthday, on the date of the examination.

Applicants must be in good health, and must attach to their applications a statement showing the number in their family dependent upon them that will require accommodations at the Indian School or Agency in case they receive appointment.

No sample questions of this examination will be furnished.

Applicants must submit to the examiner on the day of the examination their photographs, taken within two years, securely pasted in the space provided on the admission cards sent them after their applications are filed. Tintypes or proofs will not be accepted.

This examination is open to all men who are citizens of the United States and who meet the requirements.

Persons who meet the requirements and desire this examination should at once apply for Form 1312, stating the title of the examination desired, to the United States Civil Service Commission, Washington, D. C. Applications should be properly executed, including the medical certificates, but excluding the county officer's certificate, and filed with the Commission at Washington in time to arrange for the examination at the place selected by the applicant. The exact title of the examination as given at the head of this announcement should be stated in the application form.